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CHEMICAL AGE

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A PARCEL OF DRUGS

LAST Friday, the Ministry of Agriculture, Fisheries and Food, issued in dossier form the recommendations for specific substances that have been published in 1957. These cover: aldrin, arsenites, chlorobenzilate. CMPP, CMU, demeton, demeton-methyl, diazinon, dieldrin, dimefox, dipterex, endrin, fluoroacetamide, griseofulvin, malathion, organo-mercury dry seed dressings, schradan, and simazin. It is proposed to issue, from time to time, additional information with regard to new pesticides to be added to this present 'dossier' of official recommendations.

It was in 1846 that *Punch* contained a lively piece of verse that included the following lines:

> 'But chemistry now into tillage we lugs,
> And we drenches the earth with a parcel of drugs:
> Makes each fallow
> Physic swallow—
> All we poisons, I hope, is the slugs.'

A century later *Punch's* rural poet might have felt more reassured about the toxic dangers of chemical fertilisers, but he would certainly have still been apprehensive about insecticides and weedkillers.

Selective toxicity is an ideal that can only be approximately put into practice. Can a substance that gives a sufficiently total kill of crop pests be wholly safe to other forms of life, including man? One pathway towards selectivity is that of dilution, but the handling of such pesticides when making up the dilute spray solution often involves the taking of precautions. Some of the modern pesticides have a non-lasting toxicity; for a certain period—usually a number of days—their residues on or within plants will carry toxic risks, but thereafter the residues will be non-toxic, having been converted into different substances. So a new kind of safety precaution has been developed, a requirement that edible crops sprayed with these types of pesticide must not be harvested until a certain period of time has passed since the spraying.

Today, the 'parcel of drugs' is not only an enormous parcel, but it is one of bewildering variety. For a host of plant troubles there is more than a host of remedies, and even those regarded as 'harmless' have a selective toxicity that is merely relative, e.g., derris, considered one of the most harmless, is exceedingly toxic should it drift into a fish-pond. Making the Poisons Act apply to sales of the more obviously toxic of these substances was never much of a contribution towards the safer handling of them. Rather, it assisted the police in their enquiries when somebody had used one of these products on a person instead of on a crop.

The situation has created a dilemma for all governments in countries where modern agricultural or horticultural practices are followed. The economic benefits of crop protection, and of stored food protection against insect pests and rodents, are enormous; but they must be balanced against risks that accompany the use of toxic protectants. As proper methods of use can usually reduce those risks to insignificance, the official function must be one of regulating methods of use. To ban the use of a material that may be dangerous when improperly used is too negative and wasteful an attitude

unless other equally effective materials with much smaller risks are available.

However, operation of the official function of regulating methods of use is far from easy. A complex variety of substances is involved; each has its own toxicity story, and with new ones knowledge about their individual toxicities for the target pest or pests is almost always much in advance of knowledge about their other effects upon humans, domestic animals, and desirable wild life. Modern legislation in the US has put the onus upon manufacturers to show that new pesticides are 'safe,' or can be safe if handled in certain ways. This has greatly increased research costs in developing new pesticides, and some previously active companies in this field have curtailed their work.

In Britain much greater reliance is being placed upon voluntary co-operation between manufacturers and government. Only a limited number of substances is included in the range of the Agriculture (Poisonous Substances) Regulations. Most pesticides are dealt with through co-operation of manufacturers with an advisory committee, whose recommendations for use are then endorsed by the Ministry of Agriculture as 'official recommendations.' Both in principle and practice, this system seems sound and free from a negative influence upon progress.

In view of the vital nature of the information given in the newly issued dossier it is astonishing that the Ministry of Agriculture should have published this in the form of duplicated typewritten sheets. This may be the result of a new Government directive to cut expenditure, but the amateur presentation adopted could hardly have done more to suggest a relative unimportance of the information contained. A new properly printed dossier, probably with pages holed for loose-leaf filing, should be issued as soon as possible.

CHEMICAL WORKERS AND BLADDER CANCER

THREE doctors, two of them from the leading cancer research institute, namely, The Chester Beatty Research Institute, question a statement in the *Report for* 1956 *of the Ministry of Health* (Part II. On the State of the Public Health, p. 103. HM Stationery Office, 1957), on bladder cancers of chemical workers, which they regard as misleading (*Lancet*, 1958, i, 221). The statement in question is: 'Some, such as the scrotal cancers of chimney sweeps and mulespinners, the bladder cancers of chemical workers and the bone cancers of workers with bituminous paints have so far been elucidated that, for practical purposes, they have been prevented and eliminated'.

Professor E. Boyland, Dr. R. A. M. Case (Chester Beatty Research Institute, London) and Mr. D. M. Wallace (Royal Marsden Hospital, London) feel that this statement requires some clarification. They record that a statistical survey published in 1953 (Association of British Chemical Manufacturers, 'Papilloma of the bladder in the chemical industry') has led to changes in industrial practice that may, if they have been properly planned, be expected to diminish the hazard in the future. However, they point out that the nature of occupational cancer is such that they would expect *many* cases to occur during the next 20 years in men who were exposed to risk prior to the changes in industrial practice; and very few, or no, cases for about seven years among men exposed to the new conditions if the precautions were completely effective. Only when a further statistical survey is made in 10-years time will it be possible to assess the effectiveness of the present precautions.

A search made by Professor Boyland *et al.*, of death certificates relating to chemical workers where bladder tumour is mentioned among the recorded causes of death reveals, in spite of the Ministry of Health's optimistic statement in the above-mentioned report, that there has not been any falling off in the annual number, 17 cases being found in 1955 and 16 in 1956. Also, the mean annual numbers for 1945–49 and 1950–54 are noted to be 13 and 15 respectively.

Steps which have and are being taken to prevent and eliminate cancer of the bladder, are the introduction of new plant design and operation, greatly increased margins of safety for known carcinogens, general improvement in factory hygiene, and the abandonment of beta-naphthylamine manufacture.

Unfortunately new chemical compounds are being developed all the time, some of which may be carcinogens. Thus in the US, one new compound, xenylamine (4-amino diphenyl) is known to have produced human bladder cancer.

It is realised that considerable onus is put on chemical manufacturers, particularly in these times of financial cut-backs, to see that plants and processes are kept as up to date as possible. Much of their load can be lightened, however, by careful initial training of personnel likely to handle suspect substances, by continual supervision by responsible persons and frequent medical check-ups wherein up-to-the-minute cancer detection methods are employed.

POLYMERS AS ANTI-NEOPLASTICS

TWO researchers at the Roswell Park Memorial Institute, New York, William Regelson and James F. Holland, report in a recent issue of *Nature* (1958, **181**, 46), studies on the value of polyethylene sulphonates (sodium salts of polymers of ethylene sulphonates) as anti-neoplastic agents. Such polymers, active in lipolysis, have been shown to produce substantial suppression of growth in mouse tumours. Also, despite molecular weights ranging between 15,000 and 35,000 for the polymers, the same anti-neoplastic activities have been found.

Heparin and related sulphomucopolysaccharides have been recognised as mitotic inhibitors for many years. Also it is known that heparin inhibits cell division in many biological systems, including animal tumours. The anti-coagulant activity of heparin, however, is considered to reduce the possibility of its producing anti-neoplastic activity in man at safe dose-levels. No anticoagulant properties of polyethylene sulphonate have been noted with its anti-neoplastic effect.

Regelson and Holland state that of equivalent weights of drug administered, polyethylene sulphonate produces tumour inhibition of greater degree with less toxicity than does heparin.

As a result of these findings exploration of the possible anti-neoplastic activity of other anionic polyelectrolytes has begun at the Roswell Park Memorial Institute, and is indicative, it is believed, of a new class of anti-neoplastic agents.

This anionic polyelectrolyte was one of several synthesised as heparin substitutes for their anticoagulant or lipolytic activity *in vivo*.

CHEMICAL USERS SHOULD ASK FOR STANDARD PACKAGES

Multiwall Sack Maker Answers Criticisms

'IT IS REASONABLE for the users of chemicals to ask for standardisation. But it is very difficult to get the various chemical manufacturers to agree on standard sizes, though an approach from an important user would probably carry more weight than if it came from a multiwall sack manufacturer'. This point was made by Mr. O. Swan, managing director, W. Palfrey Ltd., in the course of recent correspondence with Mr. J. C. McNichol, of Dunlop Rubber Ltd.

Mr. Swan's remarks arose directly from a recent talk given by Mr. McNichol before the West Midlands branch of the Institute of Packaging. This talk was the first in a series on 'The packaging of industrial chemicals.' Both the first and second talks were reported in CHEMICAL AGE (30 November 1957, p. 879).

Mr. McNichol, went on Mr. Swan, was right in pointing to the problem of the differing density and volume of the various chemicals, and if standardisation was to be achieved then he suggested that the capacity of the sack should be varied to suit the properties of its contents without altering the two dimensions (length and width) that govern the pattern of the pallet. To effect this it would be necessary to make a sack of standard length and width, but with a thickness when filled that had a varying range from approximately 3 in. to 6 in.

One particular difficulty involved in developing block bottom sacks of this nature was that of making a change in the thickness of the valved sack without changing the valve size, and the other was that for every variation in the thickness of the sack with a constant width, an extra range of paper stocks would be necessary for the factory, so as to avoid paper wastage in too much overlapping when the tubing of the sack was made.

Preventing Spillage

The first problem was being tackled now and it was hoped that by manufacturing an insert into the valved end of the sack, so reducing the size of the valve to the size of the filling spout, the problem would be solved, since without the tight fit of the filling spout costly spillage could not be prevented.

With regard to the second problem, this involved economics in the tie up of large sums of capital, and of course, additional factory storage space for the reels of paper.

Mr. Swan said that he had been trying to answer the problem of standardisation of palletisation by the use of the block bottom type of valved sack. The problem could be easily overcome in the open mouth sewn type of sack, which was stitched after filling. So as to ensure a secure type of package when filled, it was essential that in stitching the mouth of the sack on the sewing machines, the gussets were properly inserted at the mouth so that they corresponded exactly with the foot of the sack.

The problem of economics and space for stocks of paper, naturally, still remained the same. Mr. Swan thought that a sack containing a maximum of 56 lb. of the product was desirable since then the variations in thickness from one chemical to another would not be so great as in the case of the hundredweight sack, at present used. The 56 lb. sack, which could be made shorter and more compact, would be easier to handle and while they might involve a little extra cost in packaging, their advantages with regard to ease of handling and improved storage of pallets would be in their favour.

Mr. Swan was surprised at the overall wastage due to the small amount of chemical trapped in the sacks after emptying, which had been unfavourably commented on by previous speakers. He said that unlike fabric sacks paper sacks did not normally hold the commodity and emptied it cleanly. He suggested that if the operator emptying the sack was to give it a final shake in a completely upturned position, he would find that every ounce of the product would be dislodged, unless, of course, it had become wet and adhered to the paper.

On the subject of the disposal of the empty sacks, while agreeing that there was a certain nuisance value in handling empty bags, these did have a very good salvage value which should compensate for the handling and bundling for final disposal.

Finally, on the subject of plastics liners, Mr. Swan said that his company was already supplying multiwall sacks with a loose plastics liner and if the chemical user considered a greater use of these liners advantageous, then by approaching his supplier, the latter could readily supply one inside the multiwall sack.

Plastics-Lined Fibreboard Drums can Reduce Packaging Costs

THE THIRD talk of the series was to have been given by a spokesman of the chemical manufacturers but this had to be postponed and, at short notice, two speakers from the packaging industry came forward to talk about cartons, composite containers and drums, of both fibreboard and metal, which were in general use for the packaging of industrial chemicals.

The chemical manufacturers' point of view will be given by Mr. J. G. Boyne of Imperial Chemical Industries on 17 February. Mr. Boyne is assistant to ICI's packaging adviser.

Mr. R. M. H. Scott, Metal Box Co. Ltd., gave a short talk on metal containers, mentioning that it was difficult to deal with this adequately in so far as they ranged from lead cases for radioactive materials to motor tankers for bulk transport of chemicals. However, the most common metal containers in use were the standard range of round or square lever lid tins for powdered fine chemicals and metal drums mostly 5-gallon, made of tinplate, which were non-returnable, and the heavier gauge 40-gallon steel drum.

He pointed out the steel drum as probably the strongest container used in packaging, which would stand up to more handling and misuse in transport than any other package. It was important to test all drums both for interaction between the contents and the container and for durability in transport, unless the drums had already been established as suitable for the product.

Of course, advances in lacquer technology and application had resulted recently in new outlets such as their use to contain liquid detergents. Moving on to the question of closures, Mr. Scott gave many examples such as lever lid plug and capsules, press caps, etc. Many pouring devices were discussed, including one of the latest arrivals, a vented polythene spout which was supplied with the container, in an inverted position for the customer to set up and use himself.

Finally, Mr. Scott mentioned that metal case liners in conjunction with wooden outer cases were widely used in the export trade for industrial chemicals.

In the discussion that followed his talk, the question of pouring devices was mentioned by several speakers and it was thought that the manufacturers should pay closer attention to the difficulties encountered at factory level by the chemical user who often had no easy way of emptying a metal drum so as to ensure that no spillage occurred.

Following this, Mr. Paishley of Hugh Stevenson and Sons Ltd., talked about cartons and fibreboard drums, taking as the maximum size a 40 gallon drum 20 in. diameter by 35 in. to one which would hold 1½ gallon, size 9 in. x 7 in. Wax coating could be applied and was advisable for weather-proofing, preferably on both top and bottom, though if required the whole drum could be completely waxed.

As with metal containers, closure was of paramount importance and there were three methods in general use. Firstly, using metal bands, two at right angles over the drum; secondly by glueing on the

lid; and thirdly, by using either gummed kraft strip or cloth tape which with its ability to stretch, proved advantageous in many cases. Flush fitting lids, though more expensive, were an alternative, and were very good when used for the packaging of fine powders.

As for linings to the drums, a loose polythene bag or a polythene coated board could provide additional moisture-proofing for products which needed it.

Talking of smaller drums, Mr. Paishley mentioned straight wound and spirally wound tubes which were fitted with either metal or cardboard ends and showed several examples of these for smaller unit packages. He finally talked in general terms of cartons, though these were of less importance in this field than the other two packages already mentioned.

During question time afterwards, one speaker wanted to know if British Railways were prepared to offer protection to fibreboard drums when containing chemicals. Mr. Paishley replied in the affirmative if contents were not dangerous. Manufacturers or box-makers had always to submit both package and details of contents before the package would be accepted for rail or road transport.

Another questioner wanted to know the difference between a fibreboard drum and plastics liner compared with a metal container of the same size. It was thought that the fibreboard drum with its liner could in some cases reduce the price of the packaging appreciably.

When asked if plastics bottles could be used inside drums, Mr. Paishley again replied in the affirmative. Another speaker pointed out that a comparatively thin gauge flexible plastics bottle was now being used inside a drum for the packaging of liquid in the US, and was in fact currently being tested in the UK, though as yet it was thought to be in its development stage.

GAS COUNCIL SIGNS CONTRACT FOR LIQUID METHANE IMPORTS

A CONTRACT has been signed between the Gas Council (Great Britain) and the Constock Liquid Methane Corporation of America for the experimental importation into Great Britain of liquefied natural gas by sea. This was announced by Sir Harold Smith, chairman of the Gas Council, on 3 February (see also CHEMICAL AGE, 9 November 1957, p. 758).

A cargo ship, jointly owned by the Gas Council and the Constock Liquid Methane Corporation, is at present being converted by J. J. Henry and Co., New York, and after conversion will be able to carry about 2,000 tons of liquid natural gas. It is hoped that the first shipload will arrive in the Thames within about 12 months.

If this experiment proves successful the Gas Council hope that the way will be open, subject to Government sanction, to the importation of liquefied natural gas in bulk. Every possible way of producing gas by cheaper methods is being examined. Use of imported natural gas would have the advantages of lower capital costs, less labour, and a reduction in cost of gas production. These advantages rely, however, on a low and economic cost of sea transportation.

The present experiment will cost about £1.1 million. Cost of the cargo ship, which has been purchased in dollars, and is to be converted in the US, will be about £715,000. The installation of land storage tanks for the ship's cargo of liquefied methane in the UK will cost about £400,000.

It is learned from the Gas Council that the ship undergoing conversion is a double-bottomed cargo vessel, some 340 feet long. The methane will be contained in five tanks insulated with balsa wood. About 2,000 tons of liquid methane will be carried.

The first trial loads of natural gas will be taken from the Gulf Coast oilfields, and for the trial shipment an already existing liquefaction plant, which has been constructed on a barge and can be transported to any site in the area where gas may be loaded, will be employed. This plant has a capacity of about 8 million cu. ft. of natural gas a day. When liquefied the gas will be stored in tanks on shore.

A temperature of —260 °F is required for liquefaction of natural gas at atmospheric pressure and this temperature must be maintained during transportation. When liquefied the volume of gas is reduced to 1-600th of the space it occupies in gaseous form.

Processes for the liquefaction of the gas have been developed to an advanced stage, the Gas Council report. Technical difficulties associated with these processes have been overcome by the development of materials capable of withstanding very low temperatures. There is also adequate technical knowledge of the storage of the liquefied gas.

Main terminal for the trial shipment in the UK will be at Canvey Island. Special constructional work is being undertaken by the North Thames Gas Board to receive the liquid methane. Two storage tanks now being constructed will have a capacity of about 1,000 tons of liquid methane. Constructors are the Whessoe Co. Ltd. of Darlington and the Aluminium Plant and Vessel Co. Ltd. of Crawley.

The liquid natural gas will be pumped from the cargo ship's tanks to the shore storage tanks by specially designed ships' pumps through a pipeline with a 6-in. covering of insulation. It is stated that although the shore storage tanks are heavily insulated there will be continuous boil-off of gaseous methane from the liquid and this material will be contained in a small gas-holder of the dry-sealed Wiggins type, from which it will be pumped into the mains system.

Liquid methane will be vaporised by heat exchange with water or steam but the Gas Council have no intention at present, of making use of the cold content or the refrigerating capacity of the methane. The liquid methane will be converted to gas under pressure and this pressure will be used to convey the gaseous methane into the board's transmission lines. A new line is being laid from Canvey Island to connect with a high-pressure main already in existence between Shellhaven and Romford works. The gaseous methane will be mixed with refinery gases from the Shellhaven refinery.

Town gas supplied by the North Thames Gas Board is distributed at 500 B.Th.U. per cu. ft. As methane has a calorific value of 1,000 B.Th.U. per cu. ft., transformation of the methane into gas of 500 B.Th.U. per cu. ft. will be carried out at Romford by the Onia-Gegi catalytic process.

Brief details of the Onia-Gegi process were given in CHEMICAL AGE last week, p. 231, in connection with the Shellhaven-Romford pipeline project. Methane gas will be passed over a nickel catalyst with steam to convert the gas in a mixture of mainly hydrogen, carbon monoxide and carbon dioxide having a calorific value somewhere in the region of 320 B.Th.U.'s. The gas will be mixed in the cold with the remainder of the gas to give a material of 500 B.Th.U. precisely.

The gas after transformation will have characteristics similar to gas normally produced from coal and will be suitable for consumers' appliances.

ABCM to hold Packaging of Chemicals Conference

AS A result of a decision made last September, the Association of British Chemical Manufacturers is to hold a conference on the packaging of chemicals at the Palace Hotel, Buxton, from the 17 to 20 March.

The intention is not to usurp the function of the Institute of Packaging but rather to complement the activities of that organisation, to which many ABCM members also belong: by formulating packs specifically applicable to chemical products, the association hopes effectively to improve packaging within the industry, resulting in an increase in safety and a decrease in costs. Special emphasis will be placed on packaging and distribution requirements to those European markets which may shortly be more accessible to UK chemicals.

Already more than 150 delegates from 70 companies have registered their proposed attendance. The conference, during which group studies will be undertaken, also includes visits to north western manufacturing units of Bowaters, ICI, Metal Containers and Shell Mex and BP. Papers to be presented will include: 'Packaging and distribution—their vital rôle in the export field,' by R. E. Rushen, ICI; 'Packaging and handling for an expanding European market,' by G. Downie, Unilever; and 'Technical problems in packaging for the European FTA,' by G. L. Riddell, Reed Paper Group.

Sir Hartley Shawcross has provisionally accepted an invitation to be principal speaker at a conference dinner on 19 March.

TURBULENT FLOW OF SUSPENSIONS IN TUBES

Three I. Chem. E. Papers Summarised

THREE papers of interest to chemical engineers were presented at a meeting of the Institution of Chemical Engineers, held at the Geological Society, Burlington House, London W1, on 4 February. These were: 'The turbulent flow of suspensions in tubes', Dr. A. D. Maude (Liverpool City College of Technology) and Dr. R. L. Whitmore (Department of Mining and Fuels, University of Nottingham); 'Mass transfer between fluidised particles and gas', Dr. J. F. Richardson and Dr. A. G. Bakhtiar (both of the Department of Chemical Engineering, Imperial College, London SW7); and 'Sedimentation and Fluidisation: Part II—Heat transfer from a liquid-fluidised system to a tube wall', Dr. J. F. Richardson and Dr. A. E. Mitson (both of the Department of Chemical Engineering, Imperial College, London SW7).

Short abstracts of these papers are given below.

An investigation into the mechanism of turbulent flow of a suspension in a narrow tube and an examination of how this differs from that of a simple fluid has been carried out by Dr. A. D. Maude and Dr. R. L. Whitmore. ('The turbulent flow of suspensions in tubes'). They record that the general conclusion of earlier workers appears to be that a non-thixotropic granular suspension in turbulent flow behaves as a fluid possessing the density of the suspension and the viscosity of the suspending fluid.

Aqueous suspensions of fine, graded emery powder were forced through narrow vertical tubes at various concentrations and rates of flow. A full description of the apparatus can be obtained (Maude, A. D., 'Ph.D. thesis, 1956' Nottingham, the University').

The relationship between the viscosity and the volume concentration of the suspension was measured under streamline-flow conditions in a co-axial rotating-cylinder viscometer, and the results have been depicted graphically. From an examination of possible sources of error, systematic errors in the friction factor were estimated to be less than ± 2 per cent, in Reynolds number to be less than ± 1 per cent, and in volume concentration to be less than $\pm \frac{1}{2}$ per cent. Reynolds numbers and friction factors were calculated from observations.

The authors stated that if the suspensions in turbulent flow had behaved as true liquids having the viscosity of water and density of the suspension, the experimental points would have followed the Karman-Prandtle smooth-pipe law.

$$\lambda^{-\frac{1}{2}} = 2{\cdot}00 \log_{10} (Re\lambda^{\frac{1}{2}}) - 0{\cdot}80$$

(λ = friction factor = M/F Re = Reynolds number $\frac{Ps\ Dv}{\pi}$)

However, they showed greater pressure drops at low Reynolds numbers and smaller pressure drops at high Reynolds numbers. It was also reported that if the viscosity of water was replaced by the viscosity of the suspension used in calculating the Reynolds numbers, the shape and slope of the curves was unaffected but they cross the line representing the smooth-pipe law at lower values of Re.

The shape of the curves obtained in the experiments suggested a theoretical approach to the turbulent behaviour of suspensions as they flow down a tube. Maude and Whitmore therefore put forward a theory of the behaviour of suspensions in turbulent flow in a tube. A qualitative and a tentative qualitative evaluation of the theory was presented. When the above theory was applied to the experiments described it was found that a value of k_3 of 0.09 mm. gave the best fit for all the experimental results. (k_3 is a constant depending upon the particle shape, size, density and upon the liquid density).

The equation $\pi_s = \pi (1 - k'c_t)$, where π = viscosity of suspending fluid, π_s = viscosity of suspension, k' = a constant = 5·0 for emery suspensions and c_t = volume of particles per unit volume of suspension (sub-layer), was found to be satisfactory for emery suspensions up to a volume concentration of about 20 per cent. From 20 to 27 per cent a new volume of k' had to be calculated from the measured viscosity for each concentration used and this value was used in the equation.

$$\frac{1}{\lambda^{\frac{1}{2}}} = 1 - \frac{0{\cdot}815}{p\kappa} \log_{10} \left[\frac{66{\cdot}3}{Re\lambda^{\frac{1}{2}}} \cdot \frac{1}{1-k'c - D} \cdot \frac{d}{1-k'c} \cdot \frac{k'c}{1-k'c} \right] - \frac{0{\cdot}531}{p\kappa} + 4{\cdot}14$$

p = theoretical mixing length factor

$$p = \frac{\rho_l (1-c) + q\rho_p c}{\rho_l (1-c) + \rho_p c}$$

ρ = density

κ = Karman's constant = 0·408

D = tube diameter

d = particle diameter

This approximation is stated to become very poor above 29 per cent concentration. The authors report that when the crudeness of some of the assumptions was considered together with the fact that only one adjustable constant was used, the fit between the experimental and theoretical results could be considered good. It was suggested that it was unfortunate that insufficient data had been published to allow the theory to be applied, other than quantitatively, to a range of suspensions and tube sizes.

An important result of the theory was, the authors state, that the redistribution of particles described should lead to an increase in the average concentration within the tube. This would increase the static head, and cause an error in the calculated frictional pressure drop. An estimate of the magnitude of this error showed that, whilst at intermediate and high values of Re it was negligible, at low rates of turbulent flow the true values of λ might be 4 per cent above those presented.

Mass Transfer between Fluidised Particles and Gas

FEW PAPERS in recent years have related to the interaction in the form of heat transfer, mass transfer, or chemical reaction between the gas and the particles. Dr. J. F. Richardson and Dr. A. G. Bakhtiar therefore undertook an investigation to obtain information of the rate of mass transfer between the solid and gas, and on the flow patterns in the bed.

The authors stated that much of the utility of the fluidised bed had arisen from the extemely uniform temperature that normally exists throughout. This was caused by the high rate of heat transfer between the gas and the solids, and the rapid movement of the solid particles.

In the principal experimental investigations of mass transfer so far carried out, the beds used had been at most only a few particle diameters in depth and hence, were probably very different from those in the normal fluidised bed.

Three reasons were advanced by Richardson and Bakhtiar for the unsatisfactory nature of the previous work. These were: That the quality of fluidisation was poor and therefore results were difficult to reproduce; the depth of the bed was so small that results would not necessarily have any direct bearing on the behaviour of a normal fluidised bed; and, the analytical techniques were insufficiently accurate.

Preliminary tests were carried out in which three solids (naphthalene, phthalic anhydride, and camphor) were fluidised in air using a number of different types of air distributors. Because of the shapes of the particles and the nature of their surfaces the fluidisation quality was not satisfactory.

In view of the difficulty of producing uniform fluidisation with any known material of suitable vapour pressure, it was decided to carry out experiments in which a vapour was adsorbed from an air stream on to the surface of porous solid particles. Synthetic alumina catalyst particles proved to be suitable adsorbents with good fluidisation characteristics. These were supplied by J. Crosfield and Sons Ltd., Warrington, under the trade name Synclyst 3A.

The choice of vapour was dictated by the facility of analysis. The most satisfactory instrument for such analysis was the sonic gas analyser (SGA, by Grubb Parsons). With the SGA continuous measurements were made of the composition of the gas leaving the bed and very satisfactory results were claimed with *iso*-octane vapour. (For fuller details, see A. G. Bakhtiar 'Ph.D. Thesis, 1958, London, the University'.)

In each case the experimental results were plotted as the concentration of vapour in the outlet gas, expressed as a fraction of the inlet concentration, against time. Adsorption isotherms on the solid were measured at 25°C for both *iso*-octane and toluene. It was found that over a large part of the working range in each case it was possible to approximate to the isotherm by means of straight lines represented by these equations:

iso-octane $C = 0.000525 + 0.096y$

toluene $C = 0.00106 + 0.191y$

Interpreting their results, these authors stated that having used relatively deep beds, it seemed highly probable that equilibrium was established between the outlet gas and the solid particles, so that mass transfer coefficients could not be directly calculated. The results could be used, however, to give information concerning the flow patterns in a fluidised system. Such evidence as was available suggested that there was very good mixing of the solid particles in a vertical direction and that the amount of back-mixing of the gas was relatively small, except in very shallow beds.

Isothermal Absorption

These workers then showed how the form of relation between outlet concentration and time could be obtained for isothermal adsorption in a fluidised bed in which the solids were completely mixed and in which the gas left in equilibrium with the solids.

The relation between outlet concentration and time was shown by equation and justification of the equation noted experimentally. Agreement was much better for the runs at high inlet concentration. The authors also showed that apparent discrepancies were entirely attributable to non-linearity of the isotherm.

From results obtained for the adsorption of *iso*-octane vapour in shallow and deep beds, it was concluded that there was no difference in behaviour of the deep and shallow beds. Thus results also confirmed that the time lag in the indication of the outlet concentration by the meter was not appreciable even in the experiments of shortest duration.

It was established that each element of bed was behaving in an identical manner, irrespective of its height, since the results of experiments with different bed heights could all be represented by a single straight line when plotted as $\log_e (1-y/y_o)$ against t/W. This implied that either the gas was also completely mixed, or that the transfer process takes place almost entirely in a shallow zone immediately above the bed support. It was stated, therefore, that it was very probable that virtually all of the transfer took place in this shallow zone. Of the possibility of by-passing of gas, results showed that appreciably less than 5 per cent of the total gas by-passes the solids in the bed.

In their final conclusions, Richardson and Bakhtiar stated that at the Reynolds numbers of the order of 0.1, in an isothermal fluidised bed in which mass transfer was taking place between the gas and solid, the solids were completely mixed and the gas left in equilibrium with the solids. Their work also indicated that virtually all the transfer took place within a shallow zone immediately above the bed support. Because of the rapidity with which equilibrium was approached, it had not been possible to obtain values of transfer coefficients. It was shown, however, that the coefficient must have been greater than 0.02g mole sec.$^{-1}$ (g. solid)$^{-1}$ (concentration difference as mole fraction)$^{-1}$. Further, the amount of gas passing through the bed in the form of bubbles and without mixing was shown to be negligible.

Heat Transfer From a Liquid-Fluidised System To a Tube Wall

IN an earlier paper of a series on 'Sedimentation and Fluidisation' it was shown that for a system of particles settling in the earth's gravitational field and for a fluidised bed of particles there existed a similar relationship between the concentration of particles and their velocity relative to the continuous liquid phase. In Part II—'Heat transfer from a liquid-fluidised system to a tube wall', Dr. J. F. Richardson and Dr. A. E. Mitson investigated heat transfer properties of such fluidised systems, to obtain information on the flow patterns within the system and to elucidate the mechanism of heat transfer.

Richardson and Mitson in the present paper give some details of previous investigations and showed that there were extremely wide discrepancies between the results obtained but in each case it was found that the presence of the solids was responsible for a large increase—sometimes one hundred-fold—in the value of the transfer coefficient.

A useful description of the apparatus employed for the investigations was given and special reference was made to the fluidisation tube. The experimental procedure was outlined.

It was found that at solid concentrations greater than 7 per cent by volume, the heat transfer coefficient at the tube wall reached an upper limiting value for each system and could be calculated from the following equation:

$$Nu = 55\ Pr^{0.4} \left\{\frac{C_s}{C}\right\}^{0.28} \left\{\frac{\rho V_i d}{\mu}\right\} N$$

where Nu = Nusselt number for fluidised system; Pr = Prandtl number for liquid; C_s = specific heat of solid; C = specific heat of liquid; ρ = liquid density; V_i = liquid velocity at which E (voidage of system) = I; d = diameter of particle; and μ = liquid viscosity.

At lower concentrations the coefficient, it is stated, fell off linearly to reach the value for pure liquid as the concentration of solids approached zero. These results are correlated to within 10 per cent at high concentrations but rather less well at lower concentrations. Experimental work shows that the radial temperature gradients within the bulk of the liquid decrease as the solid concentration was increased up to about 7 per cent by volume, when they were virtually eliminated. Hence resistance to heat transfer within the bulk of the liquid at solid concentrations greater than 7 per cent was very small and resistance to heat transfer of the system was genuinely concentrated near the tube-wall in the laminar sub-layer. Similarly, the thickness of the sub-layer in the fluidised system decreased with solid concentration until at concentrations greater than 7 per cent by volume a constant thickness was obtained.

The present work indicated that, for a given concentration of solids, an increase of particle size resulted in an increase of heat transfer coefficient, because the given concentration was obtained at a higher liquid velocity. There was, however, agreement with other workers that with gas-solid systems, the reverse effect was observed.

The authors felt that this observation was attributable to the fact that there was more convective movement of the small particles. They stated that in a liquid-fluidised system increased turbulence was the over-riding influence, as against increased convective transport in gas-solid systems.

It was established that the amount of back-mixing of the liquid was negligible in the systems investigated, as a uniform longitudinal temperature gradient was maintained throughout the bed.

Indian Patent on Foam Glass

IN Indian patent no. 49524, the Central Glass and Ceramic Research Institute, Calcutta describes the production of foam glass. The process consists in grinding glass of suitable composition to a fine powder and mixing it intimately with a foaming agent. The mixture is charged into moulds and heated, when the mass swells to many times its original volume. The foamed mass is then taken out of the moulds, carefully annealed, and cut into blocks of desired shape and size.

Foam glass is now being manufactured on a large scale in the US and USSR as it is finding wide applications in buildings for insulation purposes, as also the insulating of hot and cold pipes, tanks, etc.

Companies interested in undertaking commercial development of the process can apply to the secretary, National Research Development Corporation of India, Mandi House, Lytton Road, New Delhi.

At the annual dinner-dance of the NW branch, Institution of Chemical Engineers, l. to r., C. Paine (director ICI Ltd.); Sir Ben Lockspeiser, chief guest; R. J. Kingsley, hon. secretary; H. E. F. Pracy, retiring vice-chairman; Dr. A. Rees-Jones, hon. treasurer, Midlands branch; Sir Hugh Beaver, and Dr. E. H. T. Hoblyn, British Chemical Plant Manufacturers' Association

Laporte Sodium Perborate Plant in Operation Soon

AN announcement by Laporte Chemicals Ltd. indicates that their new plant for the manufacture of sodium perborate is about to begin operation at Baronet Works, Warrington. By mid-year this plant will use as one of its main raw materials, hydrogen peroxide produced by Laporte's new process. The hydrogen peroxide plant is also at Warrington. It is stated that both these projects represent substantial increases in UK productive capacity of these materials.

The company will also be completing soon the first of a series of new plants at Warrington for the manufacture of their range of organic peroxygen compounds. In addition, because of the growing demand in the UK for sodium chlorite, Laporte is actively planning the manufacture of this chemical. UK requirements for sodium chlorite are being met at present, entirely by imports.

Plastics Testing to 118 British Standards

DUPLICATED notes listing the materials and products tested by Dr. V. E. Yarsley (Plastics Testing Laboratories) Ltd., 'Oaklands', Clayton Road, Chessington, Surrey, are issued from time to time. In addition the company have recently published a booklet entitled 'The Advantages of Independent Testing' in which the work they carry out is described.

In association with Dr. V. E. Yarsley (Reseach Laboratories) Ltd. the organisation is approved by the ARB and AID part 3) for testing rubber and plastics and for the analysis of non-metallic materials.

At present 118 British standards specifications are covered, all relating to plastics and similar materials.

Film Demonstrates Zintec

The manufacture and application of Zintec zinc coated steel sheet is demonstrated in a 20-minute film made by John Summers and Sons Ltd., St. Ermin's, Caxton Street, London SW1. Entitled 'Zintec' the film will shortly be on free loan from the company for industrial and educational screening.

Chemical Engineers will be 'Cock-of-the-walk'

FORECAST that in 10 years' time the chemical engineer would be the 'cock of the walk,' came from Sir Ben Lockspeiser, chief guest, at the annual dinner/dance of the North-Western, Institution of Chemical Engineers, held on 31 January, at the Midland Hotel, Manchester. Sir Ben had paid a warm tribute to the branch chairman, Mr. H. E. Charlton, whom he described as 'one of the best chemical engineers in this country.'

'I believe there is a great need for a strong organisation of chemical engineers,' he said. They were in a growing profession and a coming profession.

There was today a great change taking place, but perhaps even more important than the change was the rate at which that change was taking place in the world. 'We must always keep our minds flexible and we must at all costs see that our young people are going to be brought up to be of maximum use to the country.'

A tribute, too, was paid to the Manchester College of Science and Technology. A year ago, said Sir Ben, he had been shown a disused mill, and was told that it would be a centre for the teaching of chemical engineering. Today it was operating as such.

The toast of the branch was proposed by Sir Hugh Beaver, president of the Institution, who stressed the need for the training of young people.

The response came from the branch chairman, Mr. Charlton. Mr. H. E. F. Pracy, retiring branch vice-chairman, proposed 'Our guests,' and Sir Ben replied. An active year was reported by the officers of the north-western branch, Institution of Chemical Engineers, at the 13th annual meeting, held in Manchester on 31 January. Mr. H. E. Charlton, chairman, welcomed the president of the institution, Sir Hugh Beaver. For election of officers see p. 293.

Mr. R. J. Kingsley, branch hon. secretary, said that meetings at which papers were read had been well attended, not only in Manchester but also in Leeds and Chester. He confessed that he was not altogether happy about contact with individual members and would like more informal opinion from members as to their requirements and wishes. He wondered, too, whether the branch had been doing enough for what he termed the production-minded people, who formed the majority of the branch members.

After the meeting, Sir Ben Lockspeiser, chairman of the Council of European Organisation in Nuclear Research, said that it was the only organisation of its kind and comprised representatives of 12 countries, 10 from West Europe, with Yugoslavia and Greece. The organisation came into being because the 12 countries could not have carried out the programme on their own, it was too expensive.

At the annual meeting of the North-Western branch, Institution of Chemical Engineers, are, l. to r., Sir Hugh Beaver, president; Sir Ben Lockspeiser, guest speaker, and H. E. Charlton, branch chairman

★ WITH commendable speed, a special ABCM sub-committee has in the space of three months organised a packaging conference to be held in March and has already 'booked' 150 delegates from 70 member-firms. It is hoped that the conference will lead to the formulation of special packs for chemicals.

In this respect the conference is complementary to the work of the Institute of Packaging. Recently, its West Midlands branch has been giving special attention to the needs of the chemical industry. CHEMICAL AGE exclusively reported the meeting last November when chemical users made constructive criticisms of some of the packs available. This week we report a further meeting and the reply made by a multiwall sack maker to the points raised last November.

These opportunities for an interchange of views and experiences, to be followed by the chemical manufacturers' point of view at a meeting later this month, are of immense value. They provide a useful and timely background to the ABCM conference and I hope that the results of the discussions on that occasion will similarly receive wide publicity both in the chemical and packaging industries.

★ COMBUSTION INSTRUMENTS, of 61 Belsize Lane, London NW3, who for some years have been producing equipment for the estimation of traces of CO in air, received a surprise call on 31 January. It was from the Medical Research Council asking for four boxes of 'CO-test' tubes needed urgently for the Transantarctic Expedition, one of whose members, Mr. Geoffrey Pratt, was last week seriously affected by carbon monoxide while on the route from the Pole to Scott Base.

The 'CO-test' tubes were flown over the week-end as a matter of great urgency to Sir Edmund Hillary at Scott Base, so that he could take them with him on his journey to Base 700 for his meeting with Dr. Fuchs. It is hoped that Dr. Fuchs will be able to make tests on the atmosphere in the cabins of his vehicles and detect any traces of exhaust gases which may be leaking in.

Mr. Leslie Minchin, proprietor of Combustion Instruments, tells me that he was glad to be able to provide the tubes immediately—in fact he delivered them to the MRC in Hampstead within an hour of receiving the request.

★ BOTH realistic and appropriate is the claim made by the British Association of Chemists for their scale of minimum salaries for chemists and chemical assistants. I had always feared that although the BAC's figures were reasonable they might be somewhat optimistic. It was therefore reassuring to hear from Mr. G. R. Langdale, BAC general secretary, that many companies were paying well above these rates. Worst off, it appears, are older men who are not in a position to leave their present employment because they are, supposedly, too old to take up a new post.

In this connection I was also interested to learn that most of the professional men unemployed as a result of the closing down of British Celanese's Spondon works have now found suitable employment, many as teachers. I hear that the BAC, although not actively involved in the matter, were keeping a watchful eye on the question.

★ NOTHING would do more to raise the prestige of technology and to promote a flow of the best brains into science and technology than the raising of technological institutes to full degree-granting status. This most interesting, if controversial suggestion—incidentally not a new one—was made by Professor Adam S. T. Thomson of the Royal College of Science and Technology, Glasgow, when he spoke at the annual dinner of former Glasgow students.

Alone of all the industrial nations, Britain has no degree-granting institutes of technology. Although there are many in the university science faculties who would dig their heels in over this point, it must sooner or later be agreed to by the Government in this modern age of technology. Many arguments can be—and have been—advanced for not taking this step. The most important single consideration, however, is whether full-degree granting status would help to overcome the increasingly serious shortage of trained scientists and technologists. If it would, then the Government should stop paying lip-service in this vital question and take immediate action.

★ OWING to the expansion of plastics, paints and printing inks and to the greater use of pigments in dope dyeing of synthetic fibres, textile printing and paper, the proportion of pigment made in the US is steadily growing. According to US figures, about 1 lb. of pigment is now produced for every 3 lb. of dyestuff. These interesting facts were given by Dr. F. M. Smith of the Geigy Co. Ltd. in a lecture last week to the junior section, Society of Dyers and Colourists at the Leeds University colour chemistry department.

Stressing the vital importance of the physical form of the pigment as opposed to that of the dyestuff, which is applied through some form of solution, Dr. Smith described the problems that have arisen with phthalocyanine blue. His full paper will be awaited with interest, if only for his explanation of the differences between the unstable alpha form and the stable beta form in relation to the phthalocyanine blues that are commercially available.

He also summarised the increasingly stringent conditions which pigments have to withstand in newer types of plastics and described the recently introduced high speed pigment equipment, such as the Kady mill, in which no grinding takes place.

★ HARD on the heels of Shell Chemical's new high performance insecticide Phosdrin, comes the results of an important discovery by workers at the Chesterford Park Research Station of Fisons Pest Control Ltd. They have developed a new selective weedkiller claimed to be the only one in the world that will control such a wide range of weeds as those at present controlled by the hormone weedkillers MCPA and 2, 4-D, including charlock, thistle, wild radish, pennycress, etc., as well as the tough 'hormone resistant' ones such as cleavers, chickweed, mayweed, redshank, spurrey, etc.

This high activity against all important cereal weeds is said to be coupled with maximum crop safety and low mammalian toxicity. Known as Fisons 18–15, it is said to provide complete safety from the five-leaf stage to the time they begin to 'run', provided they are not undersown. Temperatures below 45 °F. do not affect its efficiency.

The new weedkiller is a mixture of MCPA and TCB, and it will be known under the generic name of polyhalogenated benzoic phenoxyliphatic acids (PHBPA).

I learn that its toxicity is of the same order as that for MCPA, and 2, 4-D; in other words it presents no hazards to users. It is also claimed to have no harmful effects on game birds and other wild life.

The sale of Fisons 18–15 will be promoted in all cereal growing countries where 'hormone resistant' weeds are a problem.

★ A POLYESTER/GLASS travelling building cradle is the latest example of the use of the resin. Several advantages are claimed by the manufacturers over the conventional wooden cradle. It is not only resistant to weathering and to cleaning chemicals, but is also easy to clean down and can be kept in continuous service.

Being lighter, it is more manoeverable and is not so tiring for the workmen to operate. Because the shell is moulded in one piece, it offers protection against the weather and is also said to be valuable psychologically since it gives the workman a greater sense of security at heights.

Experience gained from a prototype model is being incorporated in the production version. Bakelite supplied the polyester resin used in the cradle and the glass reinforcement is Duramat, supplied by Turner Brothers Asbestos Co. Ltd.

Alembic

Trade Journals are Export Ambassadors

TRIBUTE to 'the family spirit' of Benn Brothers Ltd. (proprietors of CHEMICAL AGE) and its associated companies was paid by Mr. Hubert A. Oughton, chairman of W. S. Crawford Ltd., advertising agents, speaking at a staff dinner-dance given by the directors of Benn Brothers at the Connaught Rooms, London, on 31 January.

Proposing the toast of the company he also said: 'I think that the trade and technical journals of this country are among the finest ambassadors for the extension of our export trade. I have seen the publications of Benn Brothers in Trade Commissioners' offices, information offices and libraries throughout the world.'

Mr. Glanvill Benn, chairman, responded to the toast.

Sir John Benn, proposed the toast of the guests and Lt.-Col. J. L. Congdon replied. Among the guests were the secretaries of the benevolent organisations of the trades with which BB journals are associated.

AEA Contracts for Canadian Uranium

ARRANGEMENTS have been completed by Canada and the UK for the sale to the UK Atomic Energy Authority of approximately $105 million (about £38 million) of uranium. This is in addition to the $115 million order decided last year. Deliveries under the first order will be completed by 31 March, 1962. The new order will run from 1 April, 1962 to 31 March, 1963.

The Canadian Minister of Trade, Mr. Churchill, announcing this, added that negotiations were in progress for the supply by Canada of a substantial part of the AEA's uranium requirements between 1 April, 1963 and 31 December, 1966. Canada has given an assurance that the quantities requested could be increased if desired.

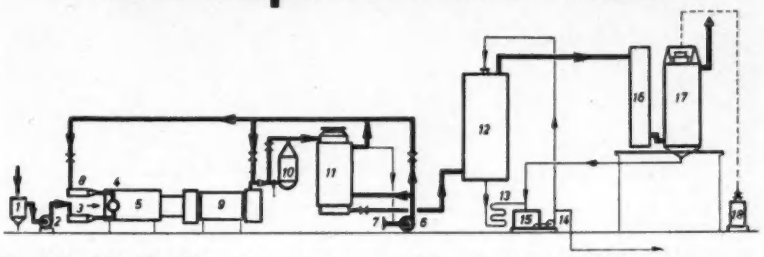
Efforts will be made to sell surplus Canadian uranium to individual friendly countries and organisations such as Euratom and OEEC.

Pneumatic Handling of Range of Materials

HANDLING of a range of materials in many parts of the world is illustrated in 'Pneumatic Handling', a brochure produced by Simon Handling Engineers Ltd., Stockport.

Two travelling plants have been installed by the company at Portishead, Somerset, for Albright and Wilson Ltd., for discharging phosphate rock. Capacity is 150 tons an hour each. Zinc ore concentrates are handled by a 12-tons-per-hour plant built for Ryland Bros. Ltd., Warrington, Lancs. The Mid-Northamptonshire Water Board has installed plant capable of handling 10 tons an hour of powdered lime and soda ash, and James Wilkinson and Sons Ltd., Rotherham, have installed plant for handling calcium fluoride by pneumatic suction and fluidised conveyors.

Collin—Power-Gas Desulphurising and Sulphuric Acid Plant



Flowsheet of the Chemiebau process for the manufacture of sulphuric acid from wet gas containing hydrogen sulphide. [1] Water trap [2] gas blower [3] filter [4] burner [5] furnace [6] fan [7] air filter [8] filter [9] waste heat boiler [10] gas cooler [11] converter [12] condensation tower [13] spray cooler [14] acid pump [15] pump tank [16] moistening tube [17] electrostatic mist precipitation [18] rectifier

A COMPLETE new AS coke oven gas desulphurising plant with attached wet contact sulphuric acid plant has been ordered by Stewarts and Lloyds Ltd. for their Corby, Northants, plant. The contractors are F. J. Collin (UK) Ltd., 9 Upper Belgrave Street, London SW1, who in 1952 installed a similar plant at Corby.

F. J. Collin have placed the order for the sulphuric acid plant with the Power-Gas Corporation Ltd. of Stockton-on-Tees. Both the new and the existing acid plant installations are to the design of Chemiebau Dr. A. Zieren GmbH.

The AS desulphurising plant is the design of F. J. Collin and the equipment require will be of British manufacture with the exception of a few items which will be brought over from Germany.

It is designed for the desulphurisation of about 17.5 million cu. ft. of coke oven gas a day but it is claimed that its capacity can be increased 100 per cent by installing only a small quantity of additional equipment. At first the throughput will be about 11 million cu. ft. a day.

Rated capacity, at normal gas throughput, of the sulphuric acid plant will be about 23 tons of 78 per cent acid a day, but this can also be doubled by installing a small amount of additional equipment. During the early stages of operation the plant will be working at an output of 13 tons a day. Completion of the whole is scheduled for January 1959.

The Collin desulphurisation process is of the absorption-desorption type incorporating the following special features:

(a) The use of a dilute ammonia solution as the desulphurising medium.

(b) Spraying the washing liquor through specially designed nozzles in unpacked towers in a number of stages.

(c) The achievement of selective absorption from the gas of hydrogen sulphide relative to carbon dioxide.

(d) The cyclic character of the process.

Collin claim that their system can reach efficiencies of up to 80–85 per cent desulphurisation. The figure for Corby is of the order of 70–75 per cent and at present about 30 tons of 60° Bé acid is being produced daily for use in the by-product plant for the manufacture of ammonium sulphate.

For economic operation the minimum concentration of hydrogen sulphide is 300 to 350 grains per cu. ft. and the volume of gas should be sufficient to produce a minimum of 15 tons of 60° Bé acid daily.

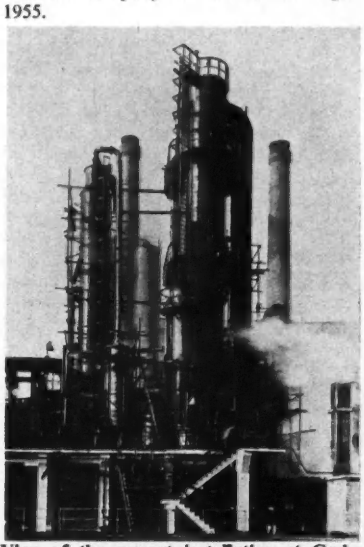
In the Chemiebau process the hydrogen sulphide from the desulphurisation plant is burnt with excess air to sulphur dioxide, cooled, if necessary, to 400–430°C and passed to a vanadium catalyst tower where it is oxidised to sulphur trioxide.

The sulphur trioxide passes from the catalyst tower to an absorption tower, which is packed with acid-resisting stoneware rings, where it is absorbed in 60° Bé sulphuric acid. Any sulphuric acid not absorbed passes through a humidifier column where water is added as a fine spray and the resulting sulphuric acid mist is removed by electrostatic precipitation.

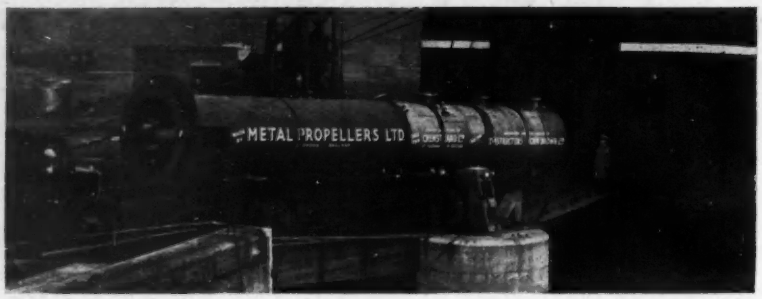
Strength of the final acid is controlled at 60° Bé by the amount of water added in the humidifier column.

Cost of the sulphuric acid produced at present is put at about £5 a ton.

F. J. Collin (UK) Ltd. are a subsidiary of F. J. Collin AG of Dortmund, Germany. The parent company was founded by Franz Joseph Collin, a Belgian, in 1869. The UK company was formed in August 1955.



View of the present installation at Corby showing the AS desulphurising plant



The 52-ft. distillation column being loaded on to the Preston-Larne ferry on its way to Coleraine

THREE DISTILLATION COLUMNS BY METAL PROPELLERS FOR CHEMSTRAND

A DISTILLATION column by Metal Propellers Ltd., 74 Purley Way, Croydon, Surrey, has been delivered to the new Chemstrand Acrilan acrylic fibre plant at Coleraine, Northern Ireland. The plant is being engineered and constructed by Constructors John Brown Ltd. The column, which is 6 ft. in diameter by 52 ft. long and weighs 11 tons, was taken by road to Preston where it was loaded by Pickfords Ltd., on to the *Bardic Ferry*, owned by Atlantic Steam Navigation.

At Larne, Northern Ireland, the column on its trailer was towed off the boat and taken to Coleraine.

The column left Croydon on 17 January and arrived at Preston on 20 January. A second column is due to be delivered in the next week or two and a third column at a later date.

Dimensions of the second column will be 7 ft. by 52 ft. and for the third 5 ft. 6 in. by 65 ft. Both will weigh about 13 tons.

Metal Propellers Ltd. are sole UK manufacturers of the Glitsch 'truss-type' bubble trays, designed by F. W. Glitsch and Sons, Inc., Dallas, Texas, US. Among advantages claimed for the Glitsch bubble trays is the fact that they are sectional in design and can be installed and replaced through manholes. It is therefore possible to build the tower in one piece.

Stainless steel was used as the construction material because of the necessity in the Acrilan process of keeping iron contamination down to the minimum.

BS for Solvents and Allied Materials

EIGHT further standards in the series for solvents and allied materials has been issued by the British Standards Institution. Four of these are revisions of earlier standards—BS 573, 575, 579 and 1999 (the first two having been published in 1950, the others in 1951 and 1953 respectively); they now reflect improvements in the qualities of material currently available.

The standards cover: Di-*n*-butyl phthalate (BS 573:1957), carbon tetrachloride (BS 575:1957), diethyl ether (technical) BS 579:1957), tritolyl phosphate (BS 1999: 1957), *o*-dichlorobenzene, Grades A and B (BS 2943/4:1957), formaldehyde solution (BS 2942:1957), paraformaldehyde (BS 2941:1957).

The two standards for *o*-dichlorobenzene are published in one volume. They specify two qualities of material, the first being substantially free from other isomers and suitable for the synthesis of organic chemicals, and the second quality normally containing appreciable proportions of *p*-dichlorobenzene, as suitable for insecticidal purposes, for use in cleaning compositions and for the manufacture of certain intermediate products.

Standards for formaldehyde solution and paraformaldehyde deal with materials of reliable quality for use in plastics and chemical manufacture generally.

Copies of these standards may be obtained from BSI, Sales Branch, 2 Park Street, London W1. (BS 573, 575, 579, 1999, 2942 and 2941. Price 4s, and BS 2943/4 (two standards under one cover) price 4s 6d.

Ramsay Fellowship in Advanced Chemistry

Applications for a Ramsay Memorial Fellowship for Advanced Students of Chemistry will be considered in June. Value of the Fellowships will be £600 a year plus a grant for personal expenses not exceeding £100 a year. It will normally be tenable for two years.

Further particulars may be obtained from the joint hon. secretaries, Ramsay Memorial Fellowships Trust, University College, Gower Street, London, W.C.1. Completed applications must be received by 18 April.

Council To Defend Right of Fluoridation

Andover, Hants, Borough Council has decided to defend a High Court action brought by the Andover Anti-fluoridation Association. The association is challenging the council's right to put fluoride in the town's water supply.

Eurochemic's Nuclear Centre At Mol

THE FOUNDERS of Eurochemic, the European company for the chemical processing of irradiated fuels, set up in Paris on 20 December last by 12 OEEC member countries, have held their first meeting at the headquarters of the organisation. In the chair was Dr. Erich Pohland, of the Federal German Ministry of Atomic Affairs; vice-chairman was Dr. Erik Svenke, head of the industrial division of the Swedish atomic energy corporation.

Purpose of the meeting was to take the necessary steps to start forthwith the preparatory work for the construction of the plant and laboratories which the company will operate near the nuclear centre at Mol, Belgium. A first team of specialists is to prepare the final plans of the plant and will start the preliminary research work immediately at the premises of the Mol centre.

BAC Recommended Salary Scale

SOME increases have been made in the 1958 'Scale of minimum salaries for chemists and chemical assistants' published by the British Association of Chemists.

For example, the minimum for senior chemists has been increased from £1,350 to £1,400. Similar increases have been made for lower grades: qualified chemists with industrial experience have had their minimum raised from £750 to £800, and lower grades have also had their minimum increased by £50.

Chemical assistants are raised by £25 a year, laboratory assistants by 10s a week and junior laboratory assistants by 5s a week.

Auxiliaries for Water Purity Meters

A NEW brochure, 'Auxiliary equipment for use with Dionic water purity meters', published by Evershed and Vignoles Ltd., London W4, covers three auxiliaries whose common purpose is to widen the range of applications of the company's Dionic water purity meter. The Evershed water cooler reduces very-high-temperature test water to a temperature within the working range (60°–160°F) of the Dionic water purity meter, while the Evershed steam condenser reduces test steam to condensate at a temperature suitable for testing.

The degree of steam purity attained in some industries nowadays is so high—i.e., the dissolved organic-salt content is so low—that the readings of the purity meter can be seriously influenced by any soluble gases present in the test condensate, and the Evershed-Straub degassing condenser has been provided to overcome this difficulty.

ICI Drum Plant Extensions

Extensions now being made to the drum-making plant at the Billingham division of ICI are part of a £230,000 scheme to increase the plant capacity by about one-third and to give an annual output of 900,000 steel drums.

STRUCTURE AND DRUG ACTIVITY—2

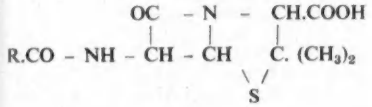
Wide Variety in Antibiotic Structure

By Peter Cooper, F.P.S., F.C.S.

THOSE of the antibiotics whose structures have been established or are tentatively known present a bewildering gamut of different compounds, in which it is difficult to see any guiding principle useful to the synthetic chemist. From simple cyclic compounds like sarkomycin (m.wt.140), containing only carbon, hydrogen and oxygen, the range extends to cyclic polypeptides like the micrococcins (m.wts. exceeding 2,000) containing nitrogen and sulphur in addition. The variety presumably derives from the multitude of ways in which a drug may interfere with bacterial metabolism. The polypeptide antibiotics probably act as surface-active agents on bacteria, whereas the simpler compounds block various stages of bacterial metabolism. As regards source, polypeptides are generally the product of bacteria; bacitracin, from *Bacillus licheniformis*, subtilin, from *B.subtilis*, the polymyxins, from *B.polymyxa*, are outstanding examples. Moulds, mostly *Penicillium* species, produce the antibiotics of the penicillin group.

The majority of other antibiotics come from actinomycetes; among others, streptomycin, neomycin, the tetracycline group, erythromycin, viomycin and nystatin. Lichens provide a few antibacterial compounds, usnic acid for example. Basidiomycetes tend to elaborate highly toxic antibiotics; grifolin is an exception. It should be noted that both usnic acid (m.wt. 250) and grifolin (m.wt. 344) are comparatively simple compounds without nitrogen or sulphur. Usnic acid, from which a number of experimental chemotherapeutic agents have been made by condensation with various amino-compounds, is a diphenyl oxide derivative which can be greatly simplified without sacrifice of antibacterial potency.

The penicillins have a thiazolidine-beta-lactam nucleus:



in which the radical R can be modified and the carboxylic group used for salt or ester formation. The original British strain produced pent-2-enyl penicillin by surface culture. Later strains, especially those X-irradiated to produce mutations, produced benzyl penicillin by deep culture. By using various precursors in the culture medium, other radicals can be introduced, some of the resulting penicillins losing the power to provoke allergic reactions in patients sensitised to benzyl penicillin. Allylmercaptomethyl pencillin (Penicillin-O) is a case in point. The desire to avoid frequent injections of soluble penicillins led to the manufacture of depot-preparations, for example the procaine salt of benzylpenicillin in oily or aqueous suspension. The N, N'-dibenzylethylenediamine salt (benzathine penicillin) serves the same purpose. Preparations intended to reduce the inactivation of soluble penicillin salts in the stomach include the aluminium and N, N'-bis- (dehydroabietyl) ethylenediamine salts. The latest addition to this group is phenoxymethyl penicillin (penicillin-V). The diethylaminoethyl ester of benzylpenicillin excited the interest of clinicians because it had a marked affinity for lung tissue, and so seemed capable of use against lung infections; but its high incidence of allergic reactions rapidly condemned it.

Some near relatives of the penicillins are the cephalosporins, whose clinical possibilities are not yet clear. Cephalosporin N has an alpha-aminoadipic side-chain in place of the penicillin side-chain R.CO—. This compound, also called synnematin B, is sensitive to bacterial penicillinase, but its relative, cephalosporin C, is comparatively resistant, and would exert a more prolonged activity. Cephalosporin P is a tetracyclic compound with two reactive hydroxyls, and is a monobasic carboxylic acid. All these antibiotics associated with a beta-lactam ring depend upon L-cysteine for their biosynthesis. This substrate appears to supply the three carbon atoms for the ring, together with the sulphur, and a nitrogen atom for the side-chain of penicillin.

Another sulphur-containing antibiotic, micrococcin P, produced by *B.pumilus*, contains eleven sulphur atoms but no reactive sulphydryl groups; its m.wt. is 2,200, and it must possess some kind of thiazolidine ring. A similar structure may be assumed for bacitracin (a complex of compounds), with one sulphur atom per molecule and no free sulphydryl group, whose m.wt. is 1,500. Bacitracin is rather toxic, like all polypeptide antibiotics, particularly towards the kidney tubules, and its main use is in local applications, where it has low sensitising potential. It seems fairly well established that antibiotics with the thiazolidine ring structure come within the clinical group of bactericidal compounds, as opposed to bacteriostatic ones, which merely prevent cell division in the parasite.

Streptomycin, another bactericidal antibiotic, is a glycoside elaborated by *Streptomyces griseus* and other species. Its basic portion, streptidine, is 1, 3-diguanidino-2, 4, 5, 6-tetrahydroxycyclohexane, which is linked to a disaccharide, streptobiosamine or streptose-2-(methylamino)-L-glucose. Its products of hydrolysis are all inactive against bacteria. The aldehyde group of the streptose moiety, however, can be reduced to the alcohol without appreciable loss of potency or change in toxicity, the resulting compound being dihydrostreptomycin. The main shortcoming of the streptomycin compounds is their dual power to sensitise the patient and provoke resistance in the bacterium. Another effective antituberculous antibiotic, viomycin (from *S. puniceus*), is a strongly basic polypeptide with, like streptomycin, a guanidine moiety. Viomycin has one primary amino group, but no reactive alpha-aminocarboxyl. Its molecular weight (about 501) is lower than that of streptomycin (582), but it is considerably more toxic.

Characteristic of the erythromycin group of antibiotics is a many-membered lactone ring with glycosidally linked sugar residues. Erythromycin, the most active and important member, has a 14-membered ring, while carbomycin (magnamycin) has a 17-membered and methymycin a 12-membered ring. The antibacterial spectra of all these compounds are similar, and resistance to one carries cross-resistance to the others. They are probably biosynthesised by condensation of acetic or propionic acid elements. Erythromycin has one nitrogen atom, probably as dimethylamino, and its m. wt. is about 734. Carbomycin consists of two isomers with m. wts. of 830. Oleandomycin, picromycin and hygromycin are other members of the series. None are likely to become important in medicine except as carefully reserved last-ditch remedies for resistant staphylococcal infections. Here they may be life-saving.

Tetracyclines

The tetracyclines form a compact trio of four six-membered carbocyclic rings, differing only in the chlorine atom at position 7 (chlortetracycline) and hydroxyl at position 5 (oxytetracycline). They offer possibilities of structure-activity research, but the three known compounds differ little in their antibacterial effect; chlortetracyline is appreciably more toxic than the others, and its stability is less. Tetracycline, the parent compound, is 4-dimethylamino-1, 4, 4a, 5, 5a, 6, 11, 12a-octahydro-3, 6, 10, 12, 12a-pentahydroxy-6-methyl-1, 11-dioxo-2-naphthacenecarboxamide, and can be produced by direct fermentation or by the palladium-catalysed hydrogenation of chlortetracycline. The three compounds are amphoteric, and their complexing power on metals may explain their bacteriostatic effect.

Chloramphenicol, originally obtained by culture of *Streptomyces venezuelae*, is the only antibiotic to be synthesised on a commercial scale. It is D-(-)-threo-

2-dichloroacetamido-1-p-nitrophenyl-1, 3-propanediol. Of the four known stereo-isomers it is the only one with anti-bacterial potency. Attempts to synthesise superior analogues have been discouraging. Interference with the dichloroacetyl group, variations in the length of the side-chain, substitution in the phenyl moiety and variation of the nitrophenyl group only serve to reduce the potency to less than one-fifth. The nitro-group is recognised as undesirable, since from it springs the occasional destruction of bone-marrow and anaemia that spells caution in the use of chloramphenicol. The palmitate and cinnamate esters have been employed to suppress the bitterness of the antibiotic.

The simple antibiotic molecules seem to be associated with antitubercular and anti-tumour activity rather than with common antibacterial effects. Sarkomycin, a feeble antibacterial but marked anti-tumour drug, is 2-methylene-3-oxocyclo-pentane carboxylic acid. Hydrogenation to the 2-methyl-acid destroys the anti-bacterial but not the anti-tumour effect, while rearrangement of the oxocyclic double-bond destroys both activities. Structural variations of the D-4-amino-3-isoxazolidone molecule of cycloserine, a tuberculostatic antibiotic, have apparently not yet been reported upon.

TWO NEW TECHNIQUES FOR MEASURING PROTEIN

TWO fast, reliable, easy methods to measure protein in food products have recently been developed by scientists of the US Department of Agriculture.

One method, developed by chemist A. J. Pinckney, of the Agricultural Research Centre, Beltsville, is based on the biuret reaction. The other, developed by chemist D. C. Udy, of the Western Wheat Quality Laboratory, Pullman, Washington, is based on excess use of a dye.

The most common way to measure protein now is the well-known Kjeldahl method, which utilises hazardous chemicals such as sulphuric acid. Protein content is figured with no distinction between protein and non-protein nitrogen. It is fairly expensive, takes long to run, requires specialised equipment and techniques.

The new method developed by Pinckney works as follows: Biuret in alkaline solution is known to react with copper ions to form a violet copper salt. Protein in alkaline solution also reacts with copper ions in the same way as does biuret, because biuret and protein have similar peptide linkages. In each case, intensity of the violet colour serves as a direct measure of protein.

In practice, the operator first prepares the reagent consisting of alkali, copper, and small amounts of glycerine. Glycerine stabilises the copper so that it does not precipitate as the hydroxide. Freshly ground wheat or flour samples are then treated with this reagent and the protein reacts with the copper ions to form a characteristic violet colour. The intensity of this colour is read in a colorimeter, and the readings are converted to protein values by means of charts that relate colour to protein.

This modification of the biuret test has been successfully applied so far only to wheat proteins, but may work for other products. The test is more rapid and much less expensive than the Kjeldahl. In addition, only true protein content is measured.

Udy's method is based on a reaction between Orange G dye (a water-soluble disulfonic acid dye) and proteins. The dye reacts with the protein molecules to form an insoluble complex—the protein is bound and cannot be broken down in solution. Therefore a known amount of Orange G dye is mixed with the protein. Tubes are stoppered and then agitated to allow complete reaction between protein and dye molecules. Insoluble protein-dye complex and other insoluble flour components are separated from the solution by centrifuging or filtering. The concentration of unbound dye in the resulting clear supernatant solution is measured in a colorimeter. The protein content of the flour or wheat sample is related to the concentration of unbound dye. Therefore, protein content can be read directly from a table previously prepared.

A single protein analysis can be made within five minutes when the agitation step is carried out in a semi-micro electric blender container.

So far, the Udy method has been used effectively on wheat and barley products, and on dry and whole milk. It can be applied to many other products where protein is important.

Cost of chemicals and power is claimed to be reduced by this method to about one-fifteenth that of the Kjeldahl method. It is at least twice as rapid. Hazardous chemicals are completely eliminated. It is adaptable to automatic techniques, and it measures native protein and not nitrogen.

It may be possible, states the USDA, to adapt these techniques for use in grain and flour selection, and quality work with other products.

RIC and SCI to Give Buffet Dance

A buffet dance is to be given by the Royal Institute of Chemistry, London Section, and the Society of Chemical Industry, London Section, at Caxton Hall, London SW1, on 22 February, beginning at 7.30 p.m. Tickets may be obtained either from Miss E. I. Beeching, 16 Chalvey Park, Slough, Bucks, or from the assistant secretary, SCI, 14 Belgrave Square, London SW1.

Proceeds are in aid of the benevolent fund (RIC) or the hospitality fund (London Section SCI).

Sulphur Recovery From Synthesis Gas

ACCORDING to a recent report (*Sulphur*, 1957, **19**, 36) synthesis gas will be used to provide a source of sulphur at the nitrogenous fertiliser plant of Empresa Nacional Calvo Sotelo de Combustibles Liquidos y Lubricantes S.A., La Coruna. The synthesis gas (83 per cent CO + H) is obtained from heating lignite in the presence of oxygen by the Koppers-Totzek process. Nitrogen is generated in a Linde installation and ammonia synthesis is based on the Casale process. The designed rate of operations is 100,000 tons a year of calcium ammonium nitrate containing 20.5 per cent nitrogen.

Annual capacity of the sulphur recovery plant will be 1,500 tons for high purity liquid brimstone. A Claus kiln has a standard catalytic converter section. Hydrogen sulphide feed is obtained from a hot potassium carbonate desulphurisation unit installed to purify the synthesis gas containing 1.6 per cent hydrogen sulphide or about 1,000 grains/100 cu. ft. Daily (24 hours) treatment capacity of the plant is 10.3 million cu. ft. gas.

Desulphurisation of the gas (from which benzol has been removed) is effected by counter-current washing in a bubble cap scrubbing column with a potassium carbonate-bicarbonate solution which absorbs hydrogen sulphide and some carbon dioxide. Regeneration of the potassium carbonate solution is effected in a distillation column under vacuum at 70°C. About 15 per cent of this scrubbing solution has to be replaced owing to a side reaction of hydrogen cyanide which is also extracted in the solution.

The extracted gas contains 75 to 80 per cent hydrogen sulphide and some carbon dioxide. Heat recovery provides most of the steam requirements. It is expected that this sulphur extraction and recovery process will prove profitable.

Scottish Limestone Project Involves £80,000 Plant

SUCCESSFUL exploitation of magnesium limestone deposits in north Scotland is indicated in the opening scheduled for March of a new quarry at Ullapool which will produce 80,000 to 100,000 tons per annum of high grade pulverised limestone. The major problem in this field in the past has been the difficulty of locating workable deposits of minerals. Where the quality has been sound the quantity has invariably proved inadequate to justify large-scale operation.

That the Ullapool deposits are considered satisfactory is indicated by the laying down of an £80,000 plant and the creation of an organisation to operate from the site. Outlets for the pulverised magnesium will be agricultural, chemical, steelmaking, and refractory industries. Quarry samples show the rock to be of high magnesium content.

The project is being sponsored by William Lind and Co. Ltd., quarry masters at Elderlie in Renfrewshire, who have laid down a major quarry unit with ancillary drying and pulverising plant to produce 300 tons of limestone per day.

Overseas News

HEAVY US PROGRAMME FOR NEW CHEMICAL FACILITIES

ABOUT $2,540 million will be spent in the US on construction of new chemical production facilities in 1958 and 1959, estimates the Manufacturing Chemists' Association. This estimate is based on the activities of companies comprising the chemical industry. The figure showing a slight increase from the 1957–58 MCA survey includes 322 projects already begun and 119 projects scheduled for groundbreaking in the near future and completion before 1960.

Projects now under way will cost about $1,830 million the survey shows. Cost of scheduled construction is estimated at $708 million.

According to results of the MCA's annual survey, chemical producers in 1957 completed 309 domestic construction projects at a total cost of $1,300 million. Combined estimated total on construction expenditures for the three-year period, 1957–59; a record $3,840 million. This represents 750 projects by 344 companies in 400 communities of 42 states. This figure does not include costs for general office, sales office, warehouse or other separate service facilities. Foreign construction and government-financed construction, too, are excluded.

The 1957-59 estimated total investment in production facilities for general organic chemicals at $987,000,000 maintains the number-one position in the classification by category. General inorganics at $710,521,000 are placed second, followed by metals, $614,825,000; plastics and resins, $451,440,000; synthetic rubber, $297,780,000; petrochemicals, $242,415,000; fertiliser chemicals, $210,875,000; textile fibres, $161,000,000; laboratories, $107,215,000, and a miscellaneous group, $62,350,000.

The metals category has been broadened in this survey to include production facilities for all ferroalloys and other special metals, as all are refined or modified by regular chemical processes, to a great extent by chemical-producing firms.

Considered particularly significant in these times is the estimated investment in research laboratory facilities. The three-year figure of $107,215,000 includes $31,220,000 for completed construction, $67,870,000 for under construction and $8,125,000 for planned construction. The industry's total research expenditure, including operating and maintenance costs, currently is estimated at approximately $500 million a year.

£25 Million BP-Bayer Petrochemical Plant

Professor Haberland, chairman of Bayer has announced that contracts for a £25-million joint petrochemical plant by British Petroleum and Bayer AG of Germany will be signed shortly. The cracking plant, which will have a throughput of 250,000 tons for production of ethylene, propylene, butylene and other materials, is already under construction and will be in operation this autumn.

This BP-Bayer plant is stated to be the largest such Anglo-German petrochemical plant, rivalling that of the Shell-Badische petrochemical project at the Rhenanian Olefine works near Bonn.

Greece Challenges Validity of Mg. Carbonate Agreement

The validity of an agreement between Greece and the American-Austrian Magnesium Co. for the exploitation of magnesium carbonate deposits in the Vavdos-Chalcidice area has been challenged by the Greek Government following the company's failure to deposit in cash the whole of a guarantee of $400,000.

Italian Capital Increase

Industrie Chimiche Squeo and Co., s.p.a., Messina, are increasing their capital from 150 to 250 million lire (£86,000 to £143,000).

Goodrich and Dutch Company to Make Rubber in Holland

B. F. Goodrich Chemical Co. of Cleveland, Ohio, and Algemene Kunstzijde Unie N.V. of Arnhem, Holland, are jointly forming a new company which will manufacture special purpose synthetic rubber in Holland. Design and construction of a plant, to be built at Arnhem, will proceed immediately, with completion scheduled for mid-1959. The new facility will be the first in continental Europe to use Goodrich know-how to produce synthetic rubber. Products of the new Dutch plant will include butadiene-styrene type latex, high-styrene reinforcing polymer, and Hycar nitrile latex.

Iraq Lifts Import Ban

The Iraq authorities have amended their regulations prohibiting the import of sulphathiazole. Import of this pharmaceutical into Iraq is now permitted.

Recovery of Pure Hydrazine by Ammonia and Sodium Metal

Separation of ammonium chloride from hydrazine produced by oxidation of ammonia with chlorine is now feasible according to US Industrial Chemicals Co., New York. In the process which is patented, metallic sodium in anhydrous ammonia is added to the mixture of hydrazine, anhydrous ammonia and ammonium chloride. The sodium reacts with ammonium chloride to produce ammonia, hydrogen and sodium chloride. By virtue of the relative insolubility of salt in liquid ammonia, most of the salt precipitates out as a solid, which can be removed by filtration, decantation or other similar means. A solution of hydrazine in liquid ammonia remains, from which pure hydrazine can readily be recovered by fractionation.

By adding an amount of sodium exactly equivalent to the chloride ions present, yields of the order of 97 per cent are claimed. The reaction proceeds at room temperature.

Reduction in Allied Chemicals Net Income

Net income for Allied Chemical and Dye Corporation, US, for 1957 is estimated at $43,398,000, equal to $4,37 per share, compared with $47,005,000 and $4.74 respectively, in 1956.

Highly Durable Fibre from Natural Gas

Information has been given by Moscow radio regarding the production of a fibre more durable than steel by the Moscow Artificial Fibres Institute. It is reported that the primary raw material is natural gas. The fibre is produced by a special process which combines methane, fluorine and ethylene.

The fibre can be used for light fabrics and knitwear, lace work and rugs, car tyres, transporter belts and machine parts.

New Process for Treating Off-grade Bauxite

A method developed by the US Bureau of Mines soon will be used commercially to beneficiate bauxite from the Quapaw deposit, Saline County, Ark., and make it suitable for alum production.

The department has released a technical report describing the method, which can be used to reduce the iron content of the Quapaw bauxite to bring it within chemical-grade specifications. This development, the department said, can help prolong the life of the nation's limited reserves of chemical-grade material.

The bauxite ore tested by the Bureau

US CHEMICAL CONSTRUCTION PROGRAMME

Category	Planned	Under construction	Completed	Total
		(in $ thousands)		
Fertiliser chemicals	45,575	50,500	114,800	210,875
Inorganic chemicals (general)	99,000	350,935	260,586	710,521
Organic chemicals (general)	171,987	517,629	297,403	987,019
Metals	76,175	396,332	142,318	614,825
Petrochemicals	104,750	88,550	49,115	242,415
Plastics and resins	151,500	101,820	198,120	451,440
Synthetic rubber	18,050	145,230	134,500	297,780
Textile fibres	—	91,000	70,000	161,000
Laboratories	8,125	67,870	31,220	107,215
Miscellaneous	32,800	25,300	4,250	62,350
Totals	$707,962	$1,835,166	$1,302,312	$3,845,440

contained 2 to 3 per cent iron oxide, slightly more than can be tolerated in alum production. Treatment by the Bureau's process reduced the iron-oxide content to less than 2 per cent, according to the report.

A copy of the publication, report of investigations 5366, 'Laboratory investigation of bauxite ore from the Quapaw Deposit, Saline County, Ark.,' can be obtained by writing the Publications-Distribution Section, Bureau of Mines, 4800 Forbes Street, Pittsburg 13, Pa. It should be identified by number and title.

CIL's New Hydrogen Peroxide Plant

Canadian Industries Ltd.'s second hydrogen peroxide plant, located at Hamilton, Ontario, is now on stream, 18 months after construction began. CIL's other plant is at Shawinigan Falls, Quebec, and has been in operation for over 21 years.

The new plant will bring the company's hydrogen peroxide production to the level of present Canadian requirements in the pulp and paper industry, the pharmaceutical industry, in rubber manufacture and the chemical industry.

Carbamate Insecticide Under Test

Formerly known as Compound 7744, a carbamate insecticide, 1-naphthyl-N-methyl carbamate (trade name Sevin), produced by Union Carbide Chemicals Co., New York, US, is now under test with US state and agricultural experimental stations.

The compound contains, as the chemical formula indicates, no chlorine or phosphorus and is described as a safe product for humans to handle. Tests to date have shown that Sevin controls a wide variety of insects. It has been found particularly promising in controlling leaf-feeding beetles and in killing moths and butterfly caterpillars.

Benelux Removes Import Duty

Benelux import duty on some chemicals has been suspended for 1958. They are:

Sulphuric acid, including fuming sulphuric acid (oleum) and sulphur dioxide; sodium dichromate; hydrogen peroxide whether or not combined with urea; sodium perborate; and acetone.

Titanium Dioxide Production in Mexico

Construction will soon be started on a plant for the production of titanium dioxide by Industrias Quimicas Basicas de Mexico, SA, in the state of Veracruz. The venture involves a capital investment of $6.5 million. The initial capacity of the plant will be 8,000 tons per year, with a reserve for an increase to 12,000 tons.

Nacional Financiera, SA, the Government's banking institution, is participating in the company as a minority stockholder, along with private Mexican capital, and it is also guaranteeing credits obtained by the company for machinery purchases. The Glidden Co., Baltimore, Md., is supplying the manufacturing process, the plant design and full technical assistance needed for the construction, installation and operation of the plant. Inquibamex engineers have been working at the Glidden plant in Baltimore for several months.

The Inquibamex plant will include a sulphuric acid unit, with a capacity of 100 tons per day. Ilmenite and sulphur, both of Mexican origin, will be used as raw materials. The realisation of the project is considerably advanced, and the plant is expected to be in operation at the end of 1958. The output will totally cover the requirements of Mexican industries and also allow for some exportation.

Inquibamex is entirely owned by Mexican interests, with no foreign investment involved.

New Filippino Fertiliser Firm

The Atlas Fertiliser Corporation, which is associated with A. Soriano and Co., Soriano Building, Manila, has been set up to produce chemicals and fertilisers with residue materials produced by the Atlas Consolidated Mining and Development Corporation.

Japanese Alkyd Resin Patent

In Japanese patent No. 2696 the preparation of a light coloured alkyd resin from glycerine and drying or semi-drying fatty acids derived by hydrolysing oil with lipases is described. An example quoted in *Glycerine News* (January 1958) is the heating together of fatty acid, 100 parts; phthalic acid, 80–150 parts; and glycerine, 40–60 parts, for several hours at 230° to 270°C in an atmosphere of carbon dioxide. The alkyd resin which results is stated to have an acid value of 6.

Methallyl Acetate Available

Methallyl acetate (isobutenyl acetate) is now said to be readily available in a 97 per cent minimum purity grade from the FMC Organic Chemicals Division of Food Machinery and Chemical Corp., Chrysler Building East, 161 East 42nd Street, New York 17, NY, US.

It is used primarily as a monomer in polymeriseration reactions, and is also expected to be of interest in preparing methallyl derivatives of value in speciality rubbers, safety glass liners, moulding powders, castings and laminates, adhesives, protective coatings, polymers, pharmaceuticals, insecticides and speciality chemicals.

Copper Oxide Recovery

Investigations are continuing at the Kansanshi Copper Mine, South Africa into methods of treating copper oxide reserves which must be exploited for economic reasons. It is reported (*S. African Mining and Engineering J.*, 1957, **68**, 925) that no means have been found so far of concentrating the oxide by flotation or gravity methods. Leaching with sulphuric acid can be done, however, and in the case of higher grade ore may be economic. The copper can be extracted from the leach solution by electrolysis if power is available.

Thorium Company Formed by Rio Tinto and Dow

Rio Tinto of Canada and Dow Chemical of Canada have formed a new enterprise Rio Tinto-Dow Ltd., whose initial purpose will be to concentrate on the production of thorium and rare earths from the by-product materials of three uranium mining companies managed by Rio Tinto in the Blind River area, Ontario.

Sulphur Mine Near Rome

An Italian and a US company have signed an agreement concerning industrial utilisation of a sulphur bed recently discovered at Pomezia, a few miles south-west of Rome.

It is estimated that this bed contains about 10 million tons of good quality sulphur, and as the mineral lies very near the surface of the earth, it should not be costly to mine.

The agreement envisages the construction of a factory to produce about 30,000 tons annually of three phosphates to be utilised in the production of detergents.

Achema Congress and Exhibition

SECOND congress of the European Federation of Chemical Engineering will start on 28 May in Brussels in connection with the Universal and International Exhibition and will be continued from 31 May to 8 June in Frankfurt (Main) within the framework of the European Congress of Chemical Engineering, to be held in conjunction with the Achema Congress 1958.

Twenty-eight member societies from 16 countries will take part in this congress. All fields of work of the European Federation of Chemical Engineering will be dealt with in six plenary lectures and 65 papers followed by discussions. The subjects include: fundamental data, laboratory techniques, measurement, control and automation techniques, works techniques, nuclear science and technology, structural materials techniques, as well as planning and rationalisation.

That part of the congress of the federation which is being held in Brussels is being organised by the Belgian member societies of the European Federation of Chemical Engineering: Branche Belge de la Société de Chimie Industrielle, Société Royale Belge des Ingénieurs et des Industriels and the Vlaamse Chemische Vereniging.

The congress in Frankfurt (Main) is being organised and managed by the Dechema, Deutsche Gesellschaft für chemisches Apparatewesen e.V., the Fachgruppe Verfahrenstechnik im Verein Deutscher Ingenieure and the Gelleschaft Deutscher Chemiker.

The programme of the congress contains particulars of all the events which will take place at the European congress of chemical engineering and the Achema Congress 1958 (32 pages, size 210 x 297 mm.) and may be obtained free of charge on application to the Dechema, Frankfurt (Main) 7, Postfach, which also accepts applications for membership of the above-mentioned congresses.

In Parliament

SILICONE FLUID IMPORTS FROM RHÔNE-POULENC A 'CLASSIC CASE OF DUMPING'

THE French manufacturers of silicone fluids, named in the Anti-Dumping (No. 1) Order 1958, were protected by a 35 per cent duty and by severe import restrictions. As a result they did not need to worry about competition in their home market and were able to sell those fluids at home at high prices and, no doubt, the profits thus gained assisted them in selling at much lower prices abroad. Hence, this was a classic case of dumping.

That was stated by Sir David Eccles, President of the Board of Trade, in moving the approval of the Order, the first made under the Customs Duties (Dumping and Subsidies) Act 1957.

Sir David declared that the use of silicone fluids was increasing in the aircraft and electrical industries and he had been told that new uses for them were expected. 'In other words, this is a branch of the chemical industry which is expanding and from which much can be hoped'.

UK Firms Not Protected

Unlike the French firm, the British companies concerned—ICI and Midland Silicones—were not protected. There were no import duties and no import quotas on French silicone fluids. The duty of 4s a lb., specified in the Order, would not be a protective duty; its effect would be to offset the unfair dumping of a single competitor.

The examination of the dumping complaint had been delayed by the partial devaluation of the franc last August, which changed the calculations of the price in France, relative to the price in this country. Sir David was satisfied that material injury was being done to the two British manufacturers whom he described as 'efficient producers', who were losing orders to the French firm; they had capacity idle. He was also satisfied that UK users would not be seriously prejudiced by having to pay the 4s duty if they continued to buy from France.

The French firm (Société des Usines Chimiques Rhône-Poulenc) did not deny that their UK prices were lower than those for France, but claimed that this was due to the smaller quantities sold in that country. That was taken into account, but it was still found that there was dumping. The average price for these fluids was about 24s. Prices at which the silicone fluids were sold in this country were between 2s to 8s per lb. above the price at which they were sold in France. There was no evidence of a price ring or an arrangement between ICI and Midland Silicones.

So far as Sir David was aware there were two manufacturers in France; the Order only referred to the firm that it named. The other manufacturer did not export to the UK. The French firm concerned did not receive a Government subsidy.

If the franc had not been devalued last August, the Order would also have applied to emulsions. The result of devaluation was to take the range of emulsions out of the Order on dumping.

No Customs Review Sought for Sulphate of Ammonia

Sir David Eccles, President of the Board of Trade, reminded the House on 28 January of his promise on 25 July last to consider the removal or alteration of the customs duty on sulphate of ammonia if an application was made by the users. No application had been received. His information was that the UK manufacturers' prices were broadly comparable with prices ruling in other countries; there did not appear to be much prospect for importing.

Priority for Zeta Research

When questioned in the Commons on 30 January regarding thermonuclear prospects for industry, Mr. R. A. Butler, Lord Privy Seal, pledged that the highest priorities would be given to Zeta research and development.

Mr. Butler said that in the Zeta achievement, British scientists were ahead of the world. He suggested also that Sir John Cockcroft had erred on the side of modesty in naming the number of years within which the Zeta experiments in thermonuclear reactions at Harwell were likely to yield results, declared Mr. Butler. He added 'But in view of his great scientific achievements, I think that we should accept his own words and wish him well for the future'. (Sir John's estimate was '20 years plus'. Editor.)

Local Authorities and Alkali Inspectorate

Questions about industrial processes producing offensive odours are to be put to the Minister of Housing and Local Government on 11 February.

Mr. Barnett Stross (Lab., Stoke-on-Trent C.) is to ask how many complaints have been submitted to the Alkali Inspectorate from all local authorities that 'certain industrial processes produce an offending odour reminiscent of tom-cats in large numbers'; in how many instances has a complete remedy been applied; and the length of time on average between complaint and cessation of odour.

On the same day, Mr. Stephen Swingler (Lab., Newcastle-under-Lyme) will ask whether the Minister is aware of the dissatisfaction of local authorities with the placing of control of atmospheric pollution in the hands of the already over-burdened Alkali Inspectorate; and if he will reconsider the question of putting control over atmospheric pollution from tileries in the hands of local authority officers.

UK Sulphur Acid Use Rose 5 Per Cent

FIGURES published by the National Sulphuric Acid Association show an increase in use of sulphuric acid in 1957 of about 5.2 per cent compared with 1956 (2,371,060 tons compared with 2,248,496 tons).

Superphosphate manufacture is still the biggest user (543,578 tons or 22.93 per cent of total), with sulphate of ammonia and titanium dioxide second and third.

The figures in these summaries exclude all Government plants.

SULPHURIC ACID AND OLEUM
(Tons of 100% H_2SO_4)

	Chamber & tower only	*Contact only*	*Chamber, Tower & contact*
Stock 1 January 1957	29,257	74,091	103,348
Production	528,716	1,807,175	2,335,891
Receipts	71,162	224,394	295,556
Oleum feed	—	4,566	4,566
Adjustments	−159	+1,007	+848
Use	361,845	1,023,450	1,385,295
Despatches	239,629	1,012,795	1,252,424
Stock 31 December 1957	27,502	74,988	102,490
Total capacity represented	702,370	2,073,320	2,775,690
Percentage production	75.3%	87.2%	84.2%

UK CONSUMPTION OF SULPHURIC ACID AND OLEUM

Trade uses	*Tons 100% H_2SO_4 1956*	*1957*	*% of total 1957*
Accumulators	10,391	11,128	0.47
Agricultural purposes	7,334	5,608	0.24
Bromine	12,240	12,800	0.54
Clays (fuller's earth, etc.)	10,859	9,670	0.41
Copper pickling	3,013	2,846	0.12
Dealers	12,750	11,964	0.50
Dichromate & chromic acid	16,116	19,738	0.83
Drugs & fine chemicals	16,699	19,098	0.81
Dyestuffs & intermediates	76,597	86,852	3.66
Explosives	20,292	15,237	0.64
Export	4,412	5,212	0.22
Glue, gelatine & size	468	516	0.02
Hydrochloric acid	61,200	58,195	2.45
Hydrofluoric acid	12,756	10,702	0.45
Iron pickling (inc. tin plate)	120,040	124,478	5.25
Leather	4,840	5,177	0.22
Lithopone	15,992	14,620*	0.62
Metal extraction	3,643	3,396	0.14
Oil refining & petroleum products	62,546	60,733	2.56
Oils (vegetable)	8,905	8,101	0.34
Paper, etc.	6,517	5,592	0.24
Phosphates (industrial)	509	643	0.03
Plastics, not otherwise classified	39,702	35,088	1.48
Rayon & transparent paper	268,233	278,610	11.75
Sewage	10,031	10,229	0.43
Soap, glycerine & detergents	76,863	98,589	4.16
Sugar refining	826	701	0.03
Sulphate of Ammonia	299,824	317,310	13.38
Sulphates of copper, nickel, etc.	26,758	24,767	1.04
Sulphate of magnesium	1,192	1,257	0.05
Superphosphates	520,050	543,578	22.93
Tar & benzole	24,857	30,275	1.28
Textile uses	18,969	14,952	0.63
Titanium dioxide	273,646	314,306	13.26
Unclassified	199,426	209,092*	8.82
Total	2,248,496	2,371,060	100.00

RAW MATERIALS
(Tons)

	Pyrites	*Spent oxide*	*Sulphur Imported*	*Sulphur Recovered H_2S & filter cake*	*Zinc concentrates*	*Anhydrite*
Stock 1 January 1957	210,020	130,245	70,851	11,975	62,407	9,514
Receipts	401,477	262,769	296,756	43,125	213,095	745,185
Adjustments	+2,969	−1,305	−88	−590	−54	−916
Use	366,908	263,560	289,109	43,564	158,858	737,114
Despatches*	8,315	16,177	3,721	151	—	—
Stock 31 December 1957	239,243	111,972	74,689	10,795	116,590	16,669

*Including uses for purposes other than sulphuric acid manufacture.

Chemist's Bookshelf

INSTRUMENTATION REFERENCE BOOK

PROCESS INSTRUMENTS AND CONTROLS HANDBOOK. Edited by *D. M. Consiotine*. McGraw-Hill Publishing Co. Ltd., London. 1957. £7 6s 6d.

This treatise is a magnificent contribution to scientific literature. It has been written by a group of 71 American specialists, each an authority in his own field, and will rank as a standard reference book on instrumentation for many years to come.

The text is divided into 13 sections, each section being separately paginated and divided into sub-sections, at the end of which there are in most cases detailed bibliographies. In addition to a table of contents at the beginning of the book, each section is prefaced by a detailed list of contents.

Section one deals with the definition of instrumentation and standards of measurement. Temperature measurement is covered in the next section under the various headings of thermocouples, radiation and optical pyrometry, resistance thermometry, thermistors as primary temperature elements, filled-system thermometers, and other temperature measuring methods. The latter includes bimetal thermometers, liquid-in-glass thermometers, pyrometric cones, temperature-sensitive substances, thermography and a noise thermometer.

Devices for measuring pressure are dealt with in the next section under the main headings of mechanical pressure elements, strain gauges and other electrical pressure transducers, and high-vacuum measurement. At the end of this section there is a comprehensive table listing the characteristics, accuracies, range etc., of the various types of pressure instrument.

Section four covers flow measurement. Sub-divisions occur under the headings of head flow meters, area flow meters, positive-displacement meters, weirs and flumes for flow measurement in open channels, and mass and magnetic flow meters. Liquid and solid level detectors are discussed in section five, while section six relates to chemical composition measurement. In this latter case the sub-sections are covered under the titles of chemical composition as a process variable, instrumental techniques for determination of chemical composition, emission spectrometry, ultra-violet absorption methods, infra-red analysis, measurement of reaction products, pH measuring systems, oxidation-reduction methods, mass spectrometry, X-ray methods, electrical conductivity methods, oxygen analysers, thermal conductivity gas analysis, polarography, analysis by fractional distillation, chemical oscillometry, nuclear magnetic-resonance and electron paramagnetic-resonance spectroscopy. Unfortunately a planned sub-section on chromatography was not received in time to include in this section.

Other process measurements are dealt with in section seven, including methods of weighing, tachometers, governors, density measurement, measurement of humidity and related variables, viscosity, consistency and photometric variables.

Sections eight and nine deal in detail respectively with all aspects of indicating and recording means and automatic controllers. Final control elements and principles of automatic control are described in the next two sections.

Some 98 pages of reference data are included in section 12, and the final section is a detailed glossary of terms used in the wide field of instrumentation.

This is a well-written handbook of some 1,400 pages, 1,000 references, numerous illustrations, tables and graphs, and it is difficult to find fault with it. All contributors are to be congratulated on what is clearly an outstanding treatise for the use of scientists and engineers in both research and industrial establishments.

E. J. CHARLES

Humbug and the Scientist

NOTHING LIKE SCIENCE. By *Magnus Pyke*. John Murray, London. 1957. Pp. 172. 16s.

Every so often a man comes along who can see beyond the immediate confines of his subject and is able to set down, for all to read, the humbug and misconceptions that abound in it. In the arts these men are of fairly common occurrence.

In the more isolated world of science this is not so. The iconoclast, when he does come along, is often hardly heard outside the learned societies and journals; the whole unfortunate scandal is hushed up and the facade of the scientific establishment remains untarnished.

For this reason alone Dr. Pyke is to be congratulated. In a book which is never dull he has succeeded in saying some very important things, things which many scientists will find embarrassing in their contacts with the world outside.

In my first paragraph I used the word 'humbug.' This was no accident for one of the chapters in Dr. Pyke's book concerns this subject. Much scientific research is devoted to humbug which admittedly is forced on to it from outside; from topers who won't drink cloudy beer or housewives who insist on having their bread wrapped.

But he insists, there is another more dangerous form of humbug which the scientist forces on himself. The use of expensive, complicated apparatus where home-made apparatus would be just as effective, the hiding of trivial results in a mass of turgid, illiterate language—these are examples of humbug which the scientist must guard against.

Having given this warning Dr. Pyke goes on to show what scientists have done and are doing, not hesitating to poke fun at gentlemen who write theses on the subject of fly ash, or who decapitate insects and then join the bodies together.

Behind all this facetiousness there is a great seriousness. Not only must people be convinced that science is beneficial materially, they must also be convinced that it is subject worth study in its own right, and should be part of the cultural background of every educated man. The first of these aims is comparatively easy in these days of the public relations officer. The second, very much more difficult, is a matter for science and for the individual scientist.

Dr. Pyke has taken the first step. Let us hope that others will follow. They may not communicate so well but the mere attempt will cause the barriers to fall and people will be able to see the magnificent structure of science that scientists have for so long concealed.

J.P.S.J.

Three CIBA Lectures on Fermentation

BACTERIAL FERMENTATIONS. By *H. A. Barker*. John Wiley and Sons, Inc., New York. Pp. vii + 95. 24s.

The three chapters of this slender book are based on three CIBA lectures on bacterial fermentations associated with (a) the production of methane, (b) the formation of butyric acid and butanol, and (c) with transformations of various nitrogen compounds respectively. All three represent almost completely chemical approaches to their problems and in view of the fact that the author has himself been concerned with these topics over many years, they comprise authoritative if somewhat expensive and specialised accounts such as cannot easily be paralleled elsewhere.

Particularly noteworthy are concise statements on the compounds and the bacteria which give methane in this connection, the role of co-enzyme A in fatty acid metabolism and especially in butyrate synthesis in bacteria, and the structural connections between bacterial fermentations of amino-acids, certain purines and pyrimidines.

Despite the recondite nature of these topics, the accounts are exceptionally fluent and well-rounded and provide admirable introductions to the relevant literature as represented by about 150 references. A satisfying feature is the obvious care the author has taken to ensure that his comparatively narrow field should effectively illustrate many of the refined techniques in use in modern microbiology. While it can hardly be regarded purely as a text-book, this scholarly booklet will appeal to many apart from those specifically concerned with bacterial fermentations.

A. H. COOK

Hickinbottom Includes Recent Work

Chemist's Bookshelf

REACTIONS OF ORGANIC COMPOUNDS. By *W. J. Hickinbottom*. Longmans, Green and Co., London. 1957. Pp. xi + 668. 45s.

There must be few organic chemists who have not heard of 'Hickinbottom,' and the reasons for the popularity of this book, which was first published in 1936, are not far to seek. In the first place, the book fills a gap between conventional textbooks in theoretical organic chemistry on the one hand and practical organic chemistry on the other. Secondly, the author achieves simplicity and elegance by reducing organic chemistry to the reactions of functional groups. Thus alcohols, glycols, enols, phenols and thiols all appear in the same chapter and this underlines their essential similarity. However, differences between and within these groups are not neglected, and one of the attractive features of the book is that it draws attention to the limitations of so-called 'general reactions.'

Another reason for the popularity of the book is that it is sufficiently detailed to be valuable to research workers (it contains numerous literature references) and yet not too complicated to be recommended to undergraduates.

Comparison of this volume with the reviewer's well-worn second edition (published in 1948) shows that most of the book has been rewritten to incorporate the important advances which have been made in preparative organic chemistry during the last decade. Many new techniques of oxidation and reduction are included, and the excellent account of the oxidation of hydroxyl functions deserves special mention. Other new topics include the 'oxo' reaction, anodic syntheses, synthetic applications of acetylenes, urea inclusion compounds and novel techniques of decarboxylation.

The appendix on the identification of organic compounds and the tables of physical constants have been omitted in the new edition. It is difficult to understand why the latter were removed; they occupied comparatively little space and greatly increased the value of the book as a laboratory companion.

In a book of this size the selection of reactions must of necessity be limited and any chemist will inevitably find that some of his pet techniques have been left out. At least one chemist would like to plead for a paragraph on the reduction of quinones to hydrocarbons mentioning Clar's valuable zinc dust fusion method. The section on carbohydrates contains some rather unconventional Haworth formulae as well as other minor blemishes and it is a pity that this section was practically untouched during the revision. On p. 321 a reaction of cyclic ketones is illustrated by reference to cyclopropanone which is surely too sensitive to survive the conditions of the reaction; perhaps this error is due to a misprint in the formulae. However, on the whole, misprints and errors are rare.

The new edition lives up to the high standard of its predecessors and 'Hickinbottom' is sure of continued success.

PETER SCHWARZ

Versatile Analytical Reagent

DAS DITHIZON UND SEINE ANWENDUNG IN DER MIKRO- UND SPURENANALYSE. By *G. Iwantscheff*. Verlag Chemie GMBH, Weinheim. 1958. Pp. 272 with 41 figures and 24 tables. DM 29.80.

Dithizone (diphenylthiocarbazone) was synthesised by Emil Fischer in 1878 and largely developed as a reagent for the micro- and trace analysis of metal ions by Hellmuth Fischer in the years following 1925. For example, it can be used to detect one part of lead in 2×10^7, a sensitivity which has only recently been equalled by the square-wave polarograph. In spite of the instability of its solutions, dithizone is much used in chemistry, metallurgy, mineralogy, geology, biology, botany, medicine, pharmacology and toxicology. There are now well over 500 publications on the subject, and these continue to appear at a rate of about 30 a year.

Dr. Iwantscheff's monograph opens with a general treatment of dithizone and its metal complexes (30 pages). The second section (47 pages) describes: the reagents required; general analytical procedures; direct and indirect extractive titrations; mono-colour, mixed-colour and the Fischer-Leopoldi reversion colorimetric methods; and the basis of separation procedures. The main part of the book (107 pages) describes the quantitative analysis of 18 transition and B sub-group metal ions, each under the headings of general introduction, basic methods, applications, and examples. There follows a shorter account of applications in qualitative analysis (17 pages); a sketch of the use of dithizone as an indicator in volumetric analysis, and its uses in emission spectroscopy, polarography and chromatography (nine pages). Appendixes deal with the synthesis of the reagent, and list its analogues (five pages). The bibliography contains 545 references.

The physico-chemical background is weak. For example, on p. 19 the list of values of the first dissociation constant of dithizone is incomplete and even omits values from a publication cited in another context on the same page. The values quoted are less useful than they might be, as the temperature is not given and no distinction is made between hydrogen ion activity and concentration. The same criticisms apply to the equilibrium constants listed in tables 6 and 7. Figure 5 (the percentage extraction of dithizone into chloroform and carbon tetrachloride as a function of pH) refers to non-equilibrium data. It is disappointing to find the solvent extraction of metal complexes discussed in 1958 without reference to the concept of stepwise equilibria.

However, the book will commend itself to practising analysts for its catholic treatment of the applications of dithizone. These include the extraction of polonium, though unfortunately Bagnall's work at Harwell was published too late to be reported in the present volume. The author index is infuriating, as it only directs the reader to the bibliography and does not allow the trail to be followed into the text.

In spite of some shortcomings, 'Das Dithizon und seine Anwendung' will clearly be a most useful handbook for analytical laboratories. It is reasonably priced, and the publishers are to be most heartily congratulated on the outstanding design of the dust-jacket.

F. J. C. ROSSOTTI

Non-uniform Approach in Review

ANNUAL REVIEW OF PHYSICAL CHEMISTRY, Vol. 8. Annual Reviews Inc., Palo Alto, California. 1957. Pp. vii + 527. $7.50.

Production of a satisfactory annual review of any science has its problems. The first of these is the problem of selection. When the space available is limited, as is practically always the case, not all important topics can be regularly included. Then, when the selection has been done, there still remains the question of treatment. Opinions differ about what type of review is most useful. Is it, for instance, better for an author to present, at the expense of completeness, a critical survey of a topic in so far as he knows it, or should he aim at completeness of coverage within the framework of a thin uncritical text and a long reference list?

The editorial committee of the series of which the volume under review is the eighth has, whether we agree with it or not, a pretty definite answer to the problem of selection. It considers that the following topics are significant enough to warrant annual survey: thermochemistry and thermodynamic properties, cryogenics, electrolyte and non-electrolyte solutions, the solid state, radiation chemistry, spectroscopy, quantum chemistry, surface chemistry and catalysis, reaction kinetics, experimental molecular structure.

All of these are included in the present volume in addition to the following topics which do not appear every year: combustion and flames, ion-exchange resins, polymer chemistry, nuclear and electron magnetic resonance, electrode processes, organic reaction mechanisms, bond energies, physical chemistry of proteins.

When the problem of treatment arises the editorial committee's stated opinion essentially is that it can best be solved

(*Continued on page* 292)

PERKIN CENTENARY TRUST RAISED MORE THAN £33,000

RESULTS of the appeal by the organisers of the Perkin Centenary Celebration have been announced. The total amount available to the Perkin Centenary Trust over the years 1955 to 1965 is £33,252 10s 6d. This total is made up as follows:

	£	s.	d.
Donations in cash	13,208	10	0
Donations under covenant	23,077	0	0
Bank interest received (less charges) ...	203	11	1
	£36,489	1	1
Expenses incurred in administration (including administration, celebrations and exhibition at South Kensington Museum)	3,236	10	7
Total amount available to the Perkin Centenary Trust over the years 1955/65	£33,252	10	6

During 1957 one Perkin Centenary Fellowship, three Perkin Centenary Scholarships and one Perkin Exchange Scholarship were awarded. The following is a list of donors to the fund:

Acheson Colloids, Albright & Wilson, Allen & Hanburys, Allied Colloids (Bradford), James Anderson & Co. (Colours), Percy Andrew & Son, Henry Ashwell & Co., Associated Ethyl Co., B. B. Chemical Co., James Beaumont & Sons, J. M. Beckett & Son, J. E. Bentley & Co., Blackburn & Sutcliffe, Bleachers' Association, Bollom, E. Bottomley & Sons, J. C. Bottomley & Emerson, Bradford Dyers' Association, Bradford Patent Dyeing Co., The Bridgecroft Dyeing Co., British Celanese, British Cellophane, British Cotton & Wool Dyers' Association, The British Drug Houses, British Paints, The British Silk Dyeing Co., Brocklehurst-Whiston Amalgamated, Brotherton & Co., Brown & Forth, Bulmer & Lumb, W. J. Bush Co.

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Fearnleys (Dyers), Fishbrook Dyeing Co., I. J. Fisher Co., Mark, Fletcher & Sons, Geigy (Holdings), Glaxo Charity Trust, Henry Goddard, R. Graesser, Graesser Salicylates, The Grove Mill Paper Co., John Hanna, James Hardcastle & Co., Hardman & Holden, Joseph Harris, Harrison & Son (Hanley), H. Harrison & Co. (Finishers), Harton Dyeworks, Hawley & Johnson, Wm. Hay, Esq., Wm. Hay, Thos. Hedley & Co., Hickson & Welch, Hinchliffe Brothers, L. B. Holliday & Co., Imperial Chemical Industries, Irvinebank Dyeworks, Johnson Bros. (Dyers), W. T. Johnson & Sons (Huddersfield), Johnsons of Hendon, Kemp Blair & Co.

Wm. Lacey (Loughborough), Lancs. Press Agency, Lankro Chemicals, Laporte Industries, Leeds & District Dyers & Finishers, Henry Lister & Sons, Loughborough Dyeworks, Lumsden & Mackenzie, Lunn & Mathers, J. Lyons & Co., J. F. Macfarlan & Co., Marchon Products, C. W. Martin & Sons, Metal Box Co., Midland Tar Distillers, Mirvale Chemical Co., Monsanto Chemicals, Morton Sundour Fabrics, Alexander Morton & Co., Murgatroyd's Salt & Chemical Co., North British Chemical Co., Norwest Ribbon Dyeing Co., Oxirane, W. Pearce & Co. (Northampton), Pearson (William), Petrochemicals, L. J. Pointing & Son, Proderite, Pullars of Perth.

The Quality Cleaners, Quarmby & Sykes, Read Manufacturing Co. (London), Reeves & Sons, Repairwell, The Riverside Dyeing Co., Herbert Roberts, Robinson Bros., James Robinson & Co., Robinson & Sons, R. L. Robinson, Roche Products, Sandoz Products, W. E. Saxby (Nottingham), Scott & Rhodes, H. H. Seddon & Sons, Sketchley, Skilbeck Bros., Jas. Smith & Sons (Cleaners), Wm. Smith & Co., Smithson & Gledhill, South Knighton Dyeworks, Peter Spence & Sons, Spray & Burgass, Spring Vale Dyeing Co., Standfast Dyers & Printers, Strachan & Co., Stevenson & Son, Stevensons (Dyers), Francis Stevenson & Sons, Sundour Bookcloths, Sun-Ray Dyeing Co. (Leicester), Synthite.

Tullis Russell & Co., The Vernon Road Bleaching & Dyeing Co., W. H. Wadsworth & Co. (Dyers), Walkden, Makin & Co., Stanley G. Walker & Co., Walshaw Drake & Co., Warner & Sons, Wm. Watson (Dundee), Weldon & Wilkinson, The Wellcome Foundation, David Whitehead & Sons, Wiggins Teape & Co. (1919), James Wilkinson & Sons, Fredk. G. Williams, Williams (Hounslow), Willow Dye Works, Frederick Wilson & Co., Kelsall & Kemp, Winterbotham, Strachan & Playne, Yates, Duxbury & Sons, Yorkshire Dyeware & Chemical Co., Yorkshire Tar Distillers.

UK-US Conference on Thermonuclear Reactions Held in Washington

BRITISH delegation at a joint UK-US conference to exchange classified information on research in controlled thermonuclear reactions was J. R. Bickerton and G. N. Harding of the Atomic Energy Research Establishment, Harwell, R. F. Hemmings and B. S. Liley of Associated Electrical Industries at Aldermaston, and H. Bodin of the Atomic Weapons Research Establishment.

The conference was held at the Naval Research Laboratory, Washington DC, US, on 3 to 5 February. The last meeting of this kind under the bilateral agreement took place at Princeton University on 17 and 18 October 1957.

The US was represented by Dr. James L. Tuck, Los Alamos Scientific Laboratory; Dr. E. D. Shipley, Oak Ridge National Laboratory, Princeton; Dr. Lyman Spitzer, Jr., Princeton; Dr. Chester Van Atta, University of California Radiation Laboratory; Dr. H. Grad, New York University; Dr. W. R. Faust, Naval Research Laboratory.

Chemical Age Year Book

Subscribers who receive their copies of CHEMICAL AGE from booksellers can obtain the CHEMICAL AGE YEAR BOOK free of charge by writing to the Manager, 154 Fleet Street, London EC4.

Detergent Sales Show a Slower Rise

DURING the last three years, the quantity of synthetic detergents used by the housewife and industry has been increasing at a much slower rate. This is stated in a report to the Ministry of Housing and Local Government, published on 4 February. (Report of the Standing Committee on Synthetic Detergents, published by HMSO, price 6d. net.) Some 34,500 tons were used domestically in 1956.

This report is the first progress statement made by the Standing Technical Committee on Synthetic Detergents, headed by Mr. H. W. Cremer, and established in January 1957. The committee was appointed to keep under review the problems arising with detergents entering sewage works, rivers and water supplies, and to encourage and assist co-ordination of research by manufacturers and public bodies to avoid or overcome these problems.

It is reported that unless the composition of detergent products alters substantially, conditions in sewage works, water supplies and rivers caused by their use are unlikely to change significantly. Still the most spectacular aspect of the problem, the committee states, is the foam on certain rivers, canals and sewage works.

One of the problems requiring consideration is the possible effect of anti-foaming agents used at sewage works on effluents and hence on rivers, and also of additives present in retailed detergent powders. Experiments are in progress at the Water Pollution Research Laboratory regarding the toxicity of detergents to fish, and their effect on reaeration essential for purification of sewage and satisfactory maintenance of river conditions.

Present ways of dealing with foaming are palliatives rather than cures, the committee points out. They are satisfied, however, that the detergent industry is making a serious attempt to overcome the difficulties and to comply with the Jephcott Committee's recommendations. Investigations are being carried out by the manufacturers with a view to producing a modified alkyl benzene sulphonate or some other surface-active agent more easily and completely broken down in sewage works practice than the alkyl benzene sulphonates at present in use.

Chemist's Bookshelf

(*Continued from previous page*)

by being ignored. It is, accordingly, content to choose authors who are active workers in the fields they write about and leave the rest to them. The result is that we get reviews belonging essentially to one or other of the categories outlined above.

In the present volume, for instance, the review on bond energies belongs to the first category (though it loses little of completeness because it is critical) while that on thermochemistry and thermodynamics belongs to the second.

H. MACKLE.

PEOPLE in the news

● MR. F. L. TURNER has been appointed to the new post of training and education officer by Pfizer Ltd., Folkestone. Aged 31, he obtained a B.Sc. degree at London University in 1953 and became an associate of the Royal Institute of Chemistry. Mr. Turner has been a lecturer in chemistry at Birmingham College of Technology and recently completed three years' research at Birmingham University. As Pfizer's training and education officer, he will be responsible for co-ordinating the company's training schemes, including a new scheme for comprehensive technical education. He will also maintain contact with schools, colleges and universities.

● MR. FRANK SCHON, chairman of Marchon Products Ltd., flew to the US on 1 February on a short business tour. His itinerary includes New York, Cincinnati and Chicago, and he intends also to visit Toronto, Canada, before returning to the UK at the beginning of March.

● MR. N. J. TRAVIS has been appointed technical director and member of the board of Borax Consolidated Ltd. responsible for research, development and production. A natural science scholar at Trinity College, Oxford, Mr. Travis graduated from the school of chemistry at Oxford University and was awarded the Whitehead Travelling Studentship, thereafter spending 12 months in the US and Canada, acquiring experience of the chemical industries in those countries. On his return to England in 1937, he joined ICI Ltd., where he held appointments with the alkali and plastics divisions, in this country and overseas. In 1953, he was appointed managing director of ICI's newly-formed subsidiary company, British Visqueen Ltd., engaged in association with the Visking Company of Chicago in the development, manufacture and sale of their new plastics packaging material—polythene film.

N. J. Travis

● MR. FREDERICK MARZILLIER has retired as vice-chairman of Marchon Products and their subsidiary, Solway Chemicals. Mr. Marzillier is remaining on both boards in an advisory capacity.

● MR. K. A. M. BARTON (sales director) and DR. R. A. GREGORY (production director) have been appointed joint managing directors of Midland Silicones Ltd. MR. S. BARRATT, former managing director, continues to serve on the board as a non-executive director. Mr. Barratt was recently appointed chairman of Albright and Wilson Ltd., parent company of Midland Silicones Ltd.

● MR. JACK WEAVER has joined Harshaw Chemicals Ltd., of Waltham Cross, Herts, as assistant general sales manager. He will continue to live in Birmingham in order to provide coverage of electroplating customers in the Midlands.

MR. R. T. F. MCMANUS continues as technical service manager for Harshaw and will work with Mr. Weaver to give thorough technical assistance to users of Harshaw processes.

● SIR WILLIAM COCKER, chairman of Cocker Chemical Co. Ltd., Oswaldtwistle, has been made a freeman of his home town, Accrington. A few years ago he was given the freedom of Wilmington, Delaware; his company has close connections with Hercules Powder Co. in that town.

● MR. J. P. OLDFIELD has been appointed by J. W. Towers and Co. Ltd. as general manager at Widnes. He is succeeded by MR. J. E. RAISBECK as manager of the Stockton-on-Tees branch. MR. H. DITCHFIELD has been appointed secretary of the company.

● MR. H. E. CHARLTON (H. E. Charlton Engineers Ltd.) was re-elected chairman of the north-western branch, Institution of Chemical Engineers, at the annual meeting last week. Other officers elected were: vice-chairman, PROFESSOR F. MORTON, professor of chemical engineering, Manchester; hon. secretary, R. J. KINGSLEY, Lankro Chemicals Ltd.; hon. treasurer, T. K. ROSS, senior lecturer in chemical engineering, Manchester College of Science and Technology; Committee, W. S. NORMAN, senior lecturer in chemical engineering, Manchester; R. PARKINS, ICI general chemicals division; W. L. SEDDON, Petrocarbon Developments Ltd.; and C. TOYNE, ICI dyestuffs division.

H. E. Charlton

● Managing director of the British Oxygen group of companies, MR. F. J. CLARK, has relinquished his appointments with the group. Mr. Clark is also chairman of British Oxygen Engineering, Sparklets and a director of British Oxygen Linde.

According to a British Oxygen spokesman, there has been some far-reaching re-organisation of the management structure of the company. In the context of these changes, Mr. Clark had, by mutual consent, relinquished his appointments with the group.

● MR. L. H. COOPER, chairman of the Mond Nickel Co. Ltd., and vice-chairman of the International Nickel Co. of Canada, Ltd., has been elected a director of the latter company.

● MR. K. D. C. BRUCE has been appointed senior sales and technical representative in the pigmentary colours division of the Geigy Co. Ltd., Middleton, Manchester, his field being the printing ink industry in the London area.

● MR. A. R. THOM, who has succeeded MR. N. J. TRAVIS as managing director of British Visqueen Ltd., joined ICI in 1946, and was associated with the development of polythene film in its early days. He has held previous appointments in ICI's southern region sales office in London and with the company's plastics division. Mr. Thom comes to his new position from the ICI northern region sales office in Manchester, where he was regional sales manager, paints and building materials department.

A. R. Thom

● M. PIERRE HUET has been appointed director of the European Nuclear Energy Agency of the OEEC, with effect from 1 February, the date on which the agency came into existence. Object of the agency is to further the development of the production and uses of nuclear energy for peaceful purposes through technical co-operation among the countries of West Europe. M. Huet, formerly general counsel of the organisation, has been responsible for the work within the OEEC secretariat on the setting up of the agency.

● MR. FRANK SMITH, director and general manager of the Dunlop Sports Co., has been appointed director and general manager of Semtex Ltd., the Dunlop flooring subsidiary. He takes up his new duties on 1 March.

Obituary

MR. CHARLES WILLIAM DYSON PERRINS has died aged 93. Mr. Perrins was life governor of Birmingham University and chairman of the Worcester Royal Porcelain Co. His philanthropic gifts included £30,000 to Oxford University for chemical research.

Commercial News

Chemstrand Expect Still Higher Acrilan and Nylon Sales

REPORTING on the financial position, operations and development of Chemstrand Corp. US, the president, Mr. Edward A. O'Neal Junr. in the company's first comprehensive annual report, states that in 1957 sales of Acrilan were up by 183 per cent over 1956 sales. Sales of nylon rose by 29 per cent. Production capacity of the Acrilan plant at Decatur, Alabama, originally 30 million lb. annually, is being increased to 45 million lb. and the nylon plant at Pensacola, Florida, with an original capacity of 50 million lb. a year, can now produce 114 million lb. The corporation is budgeting for still further increased sales in both Acrilan and nylon in 1958.

Total value of Acrilan and nylon sales amount to $146 million during 1957, as compared with $107 million in 1956. Net earnings in 1957 after payment of all expenses and taxes, totalled $20 million as compared with $12 million in 1956. Capital outlays in 1957 amounted to $44 million. Major expansions carried out in 1956, 1957 and estimated to be completed in 1958, plus normal capital outlays will have cost approximately $120 million financed chiefly by retained earnings and depreciation.

Investment in common shares of Chemstrand Ltd. will be $10 million. First production of Acrilan at Chemstrand's acrylic fibre plant at Coleraine, Northern Ireland, is planned for late 1958. Sales of Acrilan to the British textile industry in 1957 are stated to have reached satisfactory proportions.

Chemstrand Corporation have completed agreements with Societa Industrie Chemiche Edison of Milan, Italy, and with Mitsubishi Rayon Co. Ltd., of Tokio, Japan, for formation of new companies in these countries to build plants for the manufacture of acrylic fibres. These companies have been licensed to use patents covering the acrylic fibre process. In addition, Chemstrand will furnish technical know-how and information for a period of 10 years. In exchange Chemstrand will receive 26 per cent of the Italian company's stock and an option to purchase 14 per cent more. Under the Japanese agreement 33 per cent of that company's stock will be received. Royalties based on production aid will also be received from both companies.

Morgan Crucible

In part consideration for the acquisition of a further holding in Strip Carbon Co. of Great Britain, Morgan Crucible Co. have made an issue of £100,740 'A' ordinary capital.

Newton Chambers

A merger is being recommended by the respective boards of Newton Chambers and Co., chemical manufacturers, engineers and iron founders, and Ransomes and Rapier, engineers and iron founders. The merger will be by means of an exchange of four Newton Chambers £1 shares for nine Ransomes and Rapier 10s. ordinary shares. Under the terms of the merger, each company will preserve its full identity.

Royal Netherlands Salt

Another Fls.4 million (£400,000) of the new Netherlands Soda Industry shares from the Netherlands State Mines and Fls.250,000 (£25,000) of shares each from the chemical factories Mekog and of Ketjen will be acquired by Royal Netherlands Salt Industry. Netherlands Salt already own Fls.25.5 million (£2,550,000) of the Soda Industry shares. With the acquisition of the new shares, the company will become the full owner of the Fls.30 million (£3 million) share capital of Netherlands Soda Industry.

Yorkshire Imperial Metals

Last week CHEMICAL AGE (1 February, p. 246) carried a note of the new company Yorkshire Imperial Metals Ltd.—which represents the fusion of the copper and alloy tube, fittings and plate activities of the Yorkshire Copper Works Ltd. and of Imperial Chemical Industries Ltd.

The new company disposes of assets worth about £18,000,000 including the former ICI plants at Kirkby (Liverpool), Smethwick (Staffs), Landore (Swansea), and Dundee, and the former Yorkshire Copper plants at Leeds, Barrhead (Glasgow), and Castleford (Yorks). The registered office of Yorkshire Imperial Metals Ltd. is Haigh Park Road, Leeds.

The board of directors has been constituted as follows—From ICI: Dr. James Taylor (chairman), Peter T. Menzies, Dr. Maurice Cook, Michael J. S. Clapham, St. John Elstub, Harold Royle, and Walter N. Ismay. From Yorkshire Copper: George P. Norton (deputy chairman), H. F. Sherbourne (managing), W. R. D. Macdonald, C. G. Robinson, Donald Fraser, J. Christie, Clifford Breckon. The company's secretary is P. D. Peel Yates.

Berry Wiggins

Berry Wiggins and Co., oil refiners, are raising the total dividend on their £520,625 ordinary capital from 12½ per cent to 15 per cent for 1957, with a second interim of 10 per cent against 7½ per cent. No further dividend will be declared for the year.

Chilean Nitrate

Sales and other income of Chilean Nitrate and Iodine Sales Corporation for the year ended 30 June 1957 rose from Pesos 10.39 million (£5,170) to Pesos 13.16 million (£6,550). Anglo-Lautaro contributed 65 per cent against 63.33.

Production of nitrate fell by 23.52 per cent in the period reviewed and shipments declined by 20.83 per cent. Iodine sales, however, rose substantially.

The directors of the corporation hope that, despite various unfavourable circumstances, the current year will bring more favourable results. The industry has been able to obtain from the Central and other banks a special credit totalling Pesos 6,000 million (£3 million).

Increase of Capital

B. AND I. CHEMOPLAST LTD., 203 Regent Street, London W1. Increased by £2,000 beyond the registered capital of £3,000.

Market Reports

BUYING CENTRES ON SPOT BUSINESS

LONDON Although there has been a steady call for supplies in most sections of the industrial chemicals market, buying interest is largely concerned with spot transactions, and in many cases existing stocks held by consumers are adequate for nearby requirements. Notwithstanding the easy supply position prices are well held at recent levels. Overseas enquiry remains good chiefly for shipment to commonwealth destinations. The demand for fertiliser materials shows signs of expansion but it is too early to look for any marked improvement.

Activity on the coal-tar products market is fairly satisfactory with pitch, creosote oil and the cresylic acids meeting with good enquiry for home and export. Solvents and the light distillates are also attracting fair attention.

MANCHESTER Fresh enquiries on the Manchester chemical market during the past have been on a fair scale and have covered a wide range of products for home consumption as well as for export, while on the whole, there has been little cause for complaint regarding the way in which delivery specifications against existing commitments in the alkalis and other bread-and-butter lines are circulating. Prices generally continue on a firm basis and little actual change has occurred compared with a week ago. Fertiliser materials are now moving rather more freely and there is a reasonably steady demand for creosote oil, cresylic acid and a number of other tar products.

GLASGOW Business on the Scottish heavy chemical market opened on a fairly steady note, but towards the end of the week the general position was rather quieter. Prices have remained fairly steady. Little or no change can be reported in agricultural chemicals; on the export side the market still shows considerable interest.

DIARY DATES

MONDAY 10 FEBRUARY

CS—Cambridge: University Chemical Laboratory, Lensfield Road. 5 p.m. 'The physical chemistry of detonation' by T. L. Cottrell.

CS—Leeds: Chemistry Lecture Theatre, The University. 6.30 p.m. 'High-pressure chemistry' by D. M. Newitt.

CS—Leicester: The University. 4.30 p.m. 'The chemical aspects of the origin of life' by J. D. Bernal.

RIC—London: Norwood Technical College, Knight's Hill, West Norwood SE27. 6.30 p.m. 'Recent advances in the chemistry and function of the vitamins' by J. Green.

BAC—Birmingham: The University, Edmund Street, 3. 6.30 p.m. 'Nuclear magnetic resonance' by D. H. Whiffen.

TUESDAY 11 FEBRUARY

RIC—London: Sir John Cass College, Jewry Street EC3. 6 p.m. 'An organic-chemical contribution to the inorganic chemistry of nitrous acid' by C. K. Ingold.

WEDNESDAY 12 FEBRUARY

BAC—London: Wellcome Building, Euston Road NW1. 7 p.m. 'Fire prevention' by Asst. Div. Officer Dennett.

Plastics Institute—Leeds: St. Marks House, 186 Woodhouse Lane. 'Butadiene and its application' by W. J. Oldham and W. Webster.

Society for Visiting Scientists—London: 5 Old Burlington Street W1. 7.30 p.m. (dinner 6.15 p.m.). Discussion meeting, 'Science in general education'. Chairman, Willis Jackson. Speakers; A. W. Barton, Richard Fort and Sir Frank Ewart Smith.

THURSDAY 13 FEBRUARY

CS—Aberdeen: Marischal College. 7.30 p.m. 'Recent developments in the biochemistry of the nucleoside coenzymes' by J. Baddiley.

CS—London: Large Chemistry Theatre, Imperial College SW1. 7.30 p.m. Tilden lectures, 'Some recent advances in the chemistry of the vitamins D' by B. Lythgoe.

SCI—Bristol: The University, Woodlands Road, 8. 6.30 p.m. 'Studies on the alkaline fission of fatty acids, and related topics' by B. C. L. Weedon.

SCI—London: Dept. of Botany, Imperial College, SW7. 6.30 p.m. 'The enzymatic degradation of carbohydrates' (1) 'The enzymatic degradation of pectin' by R. K. S. Wood and I. Cole, and (2) 'Cellulose breakdown in wood by fungi' by J. G. Savory.

FRIDAY 14 FEBRUARY

CS & RIC—Southampton: Chemistry Dept., The University. 5 p.m. 'Some problems in aromatic chemistry' by H. C. Longuet-Higgins.

Cellobond Liquid Phenolic Resin

CELLOBOND H.832, marketed by British Resin Products Ltd., is a liquid phenolic resin, which is claimed to provide efficient plasticisation and to reinforce nitrile rubber. The high degree of compatability results in complete dispersion giving a uniform cell structure and a high blow ratio. Sponge based on this resin is stated to be resilient, dimensionally stable and resistant to heat and oil.

A technical note (No. K.203) describing the use of Cellobond rubber reinforcing resins in the preparation of nitrile rubber stocks for rubber sponge has now been published by British Resin Products. Several formulations for nitrile rubber sponge are suggested and the effect of the resin content on the properties of the various compounds is indicated.

SIMA 1958 Convention for Harrogate

THE Scientific Instrument Manufacturers' Association (SIMA) announce that their 1958 Convention will be held at the Majestic Hotel, Harrogate, from 6 to 9 November. This will be the seventh annual convention which for the first time is being held in the North.

Chemical Stocks & Shares

BANK RATE CUT EXPECTED

Prospects for Laporte Industries

THE Stock Exchange over the last few weeks, has taken a turn for the better, chemical shares have advanced from their pre-Suez prices. Owing to the strong stand that the Government is now taking to combat inflation and the continued strength of sterling, markets have been more cheerful, and it is generally expected that a reduction in the Bank Rate will be made in the very near future, perhaps within the next month. Now, surely, is the time for the wise investor to look around and select a few equities with capital appreciation in view.

Laporte Industries, registered as a public company in 1908, has five manufacturing subsidiaries in the UK and Australia engaged in the manufacture of a wide range of products, including peroxide of hydrogen, perborate of soda, barium carbonate, barium hydrate and barium peroxide. This company, under good and efficient management, is well equipped in personnel and resources to enable them to keep in the forefront in their own particular spheres of the chemical industry.

Group sales owing to expanding business and a greater volume of production increased by nearly 14 per cent during the year ended 31 March last, and since demand for staple products is well maintained the board see no reason to expect that, given a good level of national prosperity, trading results for the current year should be anything but satisfactory.

Underwriting arrangements will be completed this week for a 'rights' issue for nearly £2 million. It has been suggested, says our special correspondent, that the issue may be a new ordinary 5s share, in the ratio of one for four. At today's market price of around 15s, the price of the new share is likely to be about 12s 6d, which on the face of things seems to be attractive terms.

The company recently announced the opening of a new plant at Baronet Works, Warrington, for the manufacture of sodium perborate and by mid-year this plant will use as one of its important raw materials, hydrogen peroxide made by the company's new organic process.

At today's price of 15s the 5s Ordinary shares on their 16 per cent dividend yield 5.3 per cent.

1957/8 High	1957/8 Low	Security	4 Feb.	Change on last two weeks
23/7½	16/4½	Albright & W. 5/-	17/3	+1½d
11/6	10/6	Anchor 5/-	11/-	+3d
1/3	1/-	Ashe 1/-	1/1½	—
24/6	20/-	Bakelite 10/-	20/3	—6d
7/10½	4/9	Berk, F. W. 5/-	4/9	—
36/-	17/-	Borax 5/- Dfd.	19/-	+6d
10/9	8/10½	Bt. Chrome 5/-	10/3	—3d
13/10½	10/3	Bt. Glues 4/-	12/6	+4½d
6/4½	4/9	B. I. Plastics 2/-	5/1½	+1½d
8/6	5/6	Bt. Tar 2/6	8/1½	+1½d
35/-	27/3	Bt. Xylonite	29/9	—
4/4½	3/6	Coalite 2/-	3/6	—1½d
60/3	45/9	Fisons	49/-	—
9/6	7/7½	Hardman & H. 5/-	7/7½	—
34/6	24/1½	Hickson & W. 10/-	32/6	+1/-
46/6	36/1½	ICI	40/-	+1/6
4/9	2/6	Kleeman 1/-	3/3	—
22/1½	14/6	Laporte 5/-	15/1½	+4½d
22/-	13/9	Lawes 10/-	14/-	+3d
19/3	12/4½	Monsanto 5/-	13/9	+6d
15/6	11/-	Reichhold 5/-	11/6	+9d
11/9	8/10½	Yorkshire Dye 5/-	9/-	—

TRADE NOTES

Resin Solvent

A powerful solvent for use with plastics resins has been developed by Oxley Developments Co., Ulverston, Lancs. The compound is stated to be non-inflammable, chemically neutral and to have a low toxicity.

Use of the solvent requires no special techniques, the plastic material to be dissolved being immersed in the solvent contained in a covered receptacle to avoid wastage due to evaporation.

Oxley Developments claim that use of the solvent makes possible the salvage of electronic components from rejected units sealed in epoxy and polyester resins.

New Semtex Depot

A new Semtex depot covering the greater part of Kent has been opened at 4a St. Stephens Road, Canterbury, telephone number, Canterbury 5938. The manager is Mr. L. F. Scott.

UK Agents for Olsa

Freeman Taylor Machines Ltd., Necton Street Works, Syston, Leicester, manufacturers of stainless steel plant, have been appointed UK agents for Olsa, Milan, designers and manufacturers of chemical and pharmaceutical plant and stainless steel valves. Certain machines are to be made under licence in this country, while others will be imported.

International Instrument Show

B and K Laboratories Ltd. state that owing to the large increase in attendance at their International Instrument Show (this year to be held from 24 to 29 March) they can no longer issue personal invitations. Those interested in attending should write for tickets to the company at 57 Union Street, London SE1, or telephone HOP 4567.

Film on Rust-inhibiting Paint

A new film has been produced by Associated Lead Manufacturers on their Rustodian paint. It traces the history of calcium plumbate as a pigment, and explains in simple terms the theory of the electrical origins of corrosion. Research into the prevention of rust is shown and the application of Rustodian paint to industry. The film, which has a running time of 22 minutes, is in colour.

Change of Name

H. K. DUCKWORTH LTD., chemical manufacturers and dealers, etc., Main Street, Grange-over-Sands, Lancs. Name changed to Derrick Hemingway Ltd.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s 3d including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection on 12 March

Steroid compounds. Merck & Co., Inc. **791 771**

Method of producing benzilic acid salts of α, α-diphenyl-α-oxyacetic acid-(β dialkylaminoethyl) esters. Asal Fabrik Biologischer und Pharmazeutischer Praparate R. Holb. **791 772**

Sulphonamides. Imperial Chemical Industries Ltd. **791 923**

Purification of basic antibiotics using ion exchange resins. Pfizer & Co., Inc., C. **791 774**

Hardenable mixtures of polyglycidyl ethers. Badische Anilin- & Soda-Fabrik AG. **791 836**

Production of artificial threads and films from viscose. Vereinigte Glanzstoff-Fabriken AG. **791 775**

Recovery of tungsten from high speed steel scale and grinding swarf. Scott, F. H. **791 925**

Surface treatment of materials having a basis of an organic substitution derivative of cellulose. Celanese Corp. of America. [Addition to 787 403.] **791 776**

Detergent compositions. Hedley & Co. Ltd., T. **791 704**

Growing of single crystals. General Electric Co. **791 777**

Bubble-tray columns. Simon-Carves Ltd. (Otto & Co. Ges., Dr. C.) **791 708**

Ethyl- 3 -chloro- 2 -hydroxy-3-butenoate, and copolymers thereof, and 3-chloro-2-hydroxy-3-butenenitrile. Union Carbide Corp. **791 779**

Liquid-oxygen explosives. Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procedes G. Claude. **791 930**

Method of deoxidizing metal surfaces. Philco Corp. **791 887**

Siloxane compositions and elastomers. Midland Silicones Ltd. **791 711**

Catalyst unit. Oxy-Catalyst, Inc. **791 868**

Kilns for the manufacture of white calcium cyanamide. Suddeutsche Kalkstickstoffwerke AG. **791 877**

Apparatus for producing combustible gases. Compagnie Generale de Construction de Fours, and Cassan, J. H. F. **791 781**

Process for the manufacture of viscose rayon threads and fibres. Naamlooze Vennootschap Onderzoekingsinstituut Research. [Addition to 765 905.] **791 712**

Manufacture of titanium. Imperial Chemical Industries, Ltd. **791 783**

Preparation of 2, 6-dimethylpiperazine. Wyandotte Chemicals Corp. **791 744**

Quaternary ammonium salts of N-heterocyclic monoazo dyestuffs and their use. Geigy AG., J. R. **791 932**

Process for the polymerisation of olefines or olefine-containing mixtures. Gelsenberg Benzin AG. **791 889**

Symmetrical bis-amines. Miles Laboratories, Inc. **791 745**

Method of recovering the solvent used in the dry-spinning of polyacrylonitrile or copolymers thereof. Phrix-Werke AG. **791 784**

Apparatus for exerting a crushing action on fibrous substances in suspension. Hoesch, R. **791 909**

Derivatives of 1 : 3-diaminopropane. Miles Laboratories, Inc. **791 718**

Production of cyclic hydroxamic acids of the pyridine series. Sadolin & Holmblad Aktie-Selskabet. **791 719**

Carbamylalkyl - phosphorodithioates. Montecatini Soc. Generale per l'Industria Mineraria e Chimica. **791 824**

Liquid atomisers. Beil, G. **791 787**

Production of synthetic resins. Diamond Alkali Co. **791 894**

Bituminous bonding compounds. Carlisle Chemical Works, Inc. **791 842**

Herbicidal and fungicidal compositions. Columbia-Southern Chemical Corp. **791 825**

Production of polyethylene terephthalate. Chemstrand Corp. **791 790**

Process for the synthesis of peptides. Organon Laboratories, Ltd. **791 791**

Thermo-plastic compositions of matter. United States Rubber Co. **791 844**

Flame-retarding compositions. Associated Lead Manufacturers, Ltd., and Read, N. J. [Divided out of 791 802.] **791 803**

Dehydrochlorination process. Ethyl Corp. **791 792**

Preparation of catalvst containing ions of cobalt and molybdenum. Houdry Process Corp. **791 725**

Alcohol hydrofinishing. Esso Research & Engineering Co. **791 747**

Device for sampling gases. Atomic Energy of Canada, Ltd. **791 845**

Manufacture of aqueous solutions of chlorous acid. Chlorator Ges. **791 680**

Method for purifving or sterilising water or sewage. Chlorator Ges. **791 681**

Glass batches. Soc. Anon des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny & Cirey. **791 730**

Interhalogen adducts of polvvinyl pyrrolidone. Fairweather, H. G. C. (General Aniline & Film Corporation). **791 748**

Antibacterial composition and a process for the manufacture of same. Hoffmann-la Roche & Co. AG., F. **791 750**

Hydroxamic acid derivatives and a process for the manufacture and conversion thereof. Hoffmann-la Roche & Co. AG., F. **791 847**

Condenser discharge blasting apparatus. Nitroglycerin Aktiebolaget. **791 936**

Method and a plant for vacuum-drying heat-sensitive materials. Aktieselskabet Atlas. **791 873**

Stabilised organic mercury solutions and method of preparing same. Gallowhur Chemical Corp. **791 874**

Alkvl hvdroxy alkenoates. Union Carbide Corp. **791 356**

Vulcanisation of rubber. Goodyear Tire & Rubber Co. **791 095**

Plant for producing highly compressed air. Peregrine. E. P. **791 096**

Asphalt composition. Esso Research & Engineering Co. **791 360**

Manufacture of phthalocvanine pigments and their use. Geigy AG., J. R. **791 359**

Process for the preparation of per-fatty acids. Deutsche Gold- Und Silber-Scheideanstalt Vorm. Roessler. **791 87**

Open to public inspection on 5 March

Pigments and process of making them. Imperial Paper & Color Corp. **791 09**

Esters and a process for the manufacture thereof. Hoffmann-la-Roche & Co. AG., F. **791 17**

Plastic dispersions. Kellogg Co., M. W. **791 26**

Uranium fluoride separation of plutonium and fission products from irradiated uranium. Atomic Energy of Canada Ltd. **791 10**

Methods of producing dry stable vitamin A and/or D preparations. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. **791 18**

Process for the recovery of acetylene from gas mixtures. Nitroglycerin Aktiebolaget. **791 36**

Production of polymers and copolymers of basic monomers. American Cyanamid Co. **791 30**

Process for stabilising polyvinyl chloride and to articles of manufacture made from polyvinyl chloride which has thus been stabilised. Nederl. Castorilie-fabriek Necof N.V. **791 18**

Intrinsic factor preparations. Armour & Co. **791 18**

Amine salts of di oxo-octyl orthophosphates and compositions including same. Gulf Oil Corporation. **791 18**

Heterocyclic compounds and processes for their preparation. Soc. des Usines Chimiques Rhone-Poulenc. **791 19**

Method of recovering magnesium salts from sea water. Dow Chemical Co. **791 36**

Production of metallic iron and titanium concentrates. Titan Co. Aktieselskapet. [Addition to 754 453.] **791 36**

Process and apparatus for mixing or homogenising powdered material. Klinger, jun., M., Klinger, M., and Klinger, E., [trading as Klinger Komm-Ges.] **791 26**

Cellulose esters of aliphatic acids. Canadian Celanese, Ltd. **791 36**

Preservation of cellulose. National Cylinder Gas Co. **791 10**

Process of preparing hydroxyl end-blocked liquid organopolysiloxanes. Midland Silicones, Ltd. **791 37**

Methods of and apparatus for manufacturing adhesive materials, and adhesive materials. Scholl Manufacturing Co., Ltd. **791 26**

Method of increasing the vitamin E biological activity of a tocopherol composition containing a substantial amount of delta-tocopherol. Eastman Kodak Co. **791 10**

Diagnostic composition. Miles Laboratories, Inc. **791 22**

Process for preparing dicyclopentadienyl acids. Esso Research & Engineering Co. [Addition to 763 552.] **791 19**

Alkali-resistant silicate glass. Zeiss-Stiftung, C., [trading as Jenaer Glaswerk Schott & Gen]. **791 37**

Polyene aldehydes and the manufacture thereof. Hoffmann-la Roche & Co. AG., F. **791 20**

Polyligands containing at least two β-keto-monoacyloxy groups. Du Pont De Nemours & Co., E. I. [Divided out of 791 325.] **791 32**

Process and a device for packing liquids and pastes in a thermoplastic material. Naamlooze Vennootschap Technische Handel Maatschappij Automaco. **791 20**

Siliceous amino compounds. Nopco Chemical Co. **791 20**

Hydantoin derivatives. Merck & Co., Inc. [Divided out of 791 327.] **791 32**